

GLASGOW

ITS ORIGIN GROWTH AND DEVELOPMENT



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THE
CITY OF GLASGOW
ITS ORIGIN, GROWTH
AND DEVELOPMENT

WITH MAPS AND PLATES

JOHN GUNN, D.Sc., Honorary Editor

MARION I. NEWBIGIN, D.Sc., Editor

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CONTENTS

	PAGE
EDITORIAL,	1
GLASGOW AND ITS GEOGRAPHICAL HISTORY. By Professor J. W. GREGORY, D.Sc., F.R.S. (<i>With Sketch-Map</i>), . . .	2
THE PEOPLE OF GLASGOW. By Professor T. H. BRYCE, M.A., M.D.,	13
THE CATHEDRAL AND BISHOPRIC. By Dr. GEORGE NEILSON, .	21
MUNICIPAL HISTORY AND ACTIVITIES. By Sir JOHN LINDSAY, J.P., D.L., Town Clerk of Glasgow. (<i>With Illustrations</i>),	26
THE RISE OF TRADE AND INDUSTRY. By WILLIAM POWER, .	37
THE PORT AND ITS DEVELOPMENT. By D. M. MACINTYRE, M.B.E., F.C.I.S., Assistant Secretary to the Trustees of the Clyde Navigation. (<i>With Map and Illustrations</i>), . .	42
GEOGRAPHY AT THE UNIVERSITY OF GLASGOW. By Principal Sir DONALD MACALISTER, K.C.B., M.A., M.D., D.C.L., LL.D., D.Sc.,	53
OVERSEAS RELATIONS. By A. STEVENS, M.A., B.Sc., Lecturer in Geography in the University of Glasgow,	56
THE CARTOGRAPHY OF GLASGOW. By JOHN ARTHUR BROWN, Hon. Sec. of Glasgow Archaeological Society. (<i>With List of Old Maps and Illustrations Reproduced</i>),	67
BIBLIOGRAPHICAL NOTE. By A. STEVENS, M.A., B.Sc., . . .	76
L'ENVOI. By Sir HALFORD J. MACKINDER, M.P.,	77

MAPS and PLATES (*see p. 75*).

THE SCOTTISH GEOGRAPHICAL MAGAZINE.

EDITORIAL.

IN the autumn of 1919 the Royal Scottish Geographical Society, in collaboration with the Committee for the National Collection of Old Maps of Scotland, published a small book devoted to the city of Edinburgh, illustrated by a long series of maps, plans, and old views. A hope was then expressed that it might be possible to follow this up by the issue of a similar publication dealing with Glasgow; but the steady rise in printing costs seemed at one time likely to make it necessary to postpone the enterprise indefinitely. Last summer, however, through the representations of a number of influential Glasgow citizens, the Town Council of Glasgow became interested in the scheme, and eventually made a grant to the Society in furtherance of it from the surplus funds of the Scottish Historical Exhibition.

The grateful thanks of the Society are thus due in the first instance to the Town Council, no less than to the individual contributors of the various articles which follow. Much assistance has also been rendered by others, and special acknowledgment is due to the following:—Sir John Lindsay, Town Clerk; the late Dr. Robert Renwick, who before his death had put his highly specialised knowledge at the disposal of the Editor; Mr. Thomas Nisbet, C.E., Master of Works and City Engineer, who lent old maps from the Corporation's collection, and gave much useful advice; Mr. T. C. F. Brochie, Superintendent of Glasgow Art Galleries and Museums, who advised as to old views suitable for reproduction, and assisted in many ways in connection with them; Mr. T. R. Mackenzie, Secretary of the Clyde Navigation, and the Trustees, who generously presented copies of the coloured map which accompanies Mr. Macintyre's article on the Port; Mr. Thomas Cameron of the Glasgow Chamber of Commerce; Mr. W. Power of the editorial staff of the *Glasgow Herald*; and Mr. J. A. Brown, who, in addition to contributing the article on the Cartography, took an active part in

selecting the old maps for reproduction. Mr. J. W. Gourlay, Local Secretary and Treasurer, and the other members of the Committee manifested a continued interest in the project, and to them also the Society owes grateful thanks. Prof. Gregory, of Glasgow University, in addition to contributing the first article, gave much valuable advice as to suitable articles, and himself approached a number of the specialists able to supply these. Others whose names should be mentioned are Dr. W. G. Black and the late Dr. J. G. Bartholomew, whose death, while the scheme was still in its early stages, was an irreparable loss.

The book will be found to offer many contrasts to that which was devoted to Edinburgh, and it is hoped that the difference in treatment reflects in some measure the difference between the two capitals of Scotland. A special feature of the articles as a whole will be found to be that they fall more or less precisely into two sets, those approaching the subject from the detached scientific standpoint, and those written by men who are themselves engaged in making history. To the geographer it is not without interest to note, that while the latter tend to lay stress upon the way in which man has modified the physical conditions to serve his own ends, the former, notably Prof. Gregory, emphasise the fact that man, after not a little uncertainty and fumbling, has learnt merely to take full advantage of the latent possibilities of the position.

Another point of great interest is raised in Prof. Bryce's article. He shows that there is every reason to believe that, so far as physical characters are concerned, there has been no fundamental change in the population of the Clyde valley from prehistoric times to the present day. Further, since the chief racial element is "Iberian," the element which has always been predominant in Ireland, we have the curious fact that the most Scottish of all cities has a pronouncedly "Irish," or, as some would say, "Celtic," population. Many other similar points of general interest rise from the combination of the several articles, and it is their presence which gives such studies a wider importance than the purely local one.

GLASGOW AND ITS GEOGRAPHICAL HISTORY.

(*With Sketch-Map.*)

By Professor J. W. GREGORY, D.Sc., F.R.S.

THE rise of Glasgow to the position, as regards population, of the third city of the British Empire (Calcutta being the second), of commercial capital of Scotland, and of the greatest shipbuilding centre in the world, though a modern development, is due to natural advantages which made Glasgow one of the earliest settlements in Scotland. The modern advantages of the site are its proximity to so commodious and defensible

a harbour as the Clyde estuary ; its position on the western edge of the coal and iron fields of Lanarkshire ; its convenience as a business centre for southern Scotland, for it is equidistant from St. Abb's Head, the Solway, and Islay ; its outlet through the Firth of Clyde to the Atlantic, while being also easily accessible to northern Europe through the Firth of Forth, on which the port of Grangemouth is only two and twenty miles distant ; and its situation on the easiest direct route from the Highlands through Strathclyde and Annandale to the north of England—Stirling alone being in this respect in a comparable position. Moreover, as the meeting place where the people from the Highlands and Lowlands blended with one another and with immigrants up the Firth of Clyde from northern Ireland, Glasgow has a composite population, endowed with the varied capacities necessary for the full use of its varied resources and opportunities. Some of these advantages have been helpful only in the modern industrial development of the city ; but Glasgow, owing to the manifold geographical merits of its site, was among the first prehistoric settlements in Scotland and has been often claimed as the oldest of Scottish towns. Its special attractions to primitive man were doubtless the fords across the Clyde, the ease of access to the fishing grounds in the estuary, and the excellent sites for salmon traps provided by the neighbouring shallows. The tradition—one of the numerous variants of the lost ring and fish legend—of St. Mungo's miraculous recovery from a salmon of a precious ring thrown into the river by an injured chieftain, which is memorialised in the Glasgow arms, is appropriate, as the city was probably founded as a fishing village. The site was equally open to the rich game fields of Strathclyde and the bordering hill country, which then harboured wild cattle and red deer, bear and wolf, sheep and goat, pig and badger, otter and beaver, hare and fox ; and from them the primitive hunters obtained food and furs, skins, bones, and sinews. The local soils supplied excellent pottery clay and the forests provided inexhaustible firewood, and the oaks which by fire and stone axe were fashioned into dug-out canoes. These primitive craft, the contemporary stone implements and burial places are the earliest direct evidence of prehistoric Glasgow ; and as some of these relics date from the newer stone age or Neolithic, they belong to the earliest human occupation of the mainland of Scotland.

The great antiquity of this settlement is shown by the different geographical condition of Glasgow at its date from that of the Roman period. When the makers of the canoes paddled them over the site of Argyle Street the climate was much colder than at present, for glaciers were no doubt still in existence on the Scottish mountains. A sheet of ice had previously covered the Glasgow district, as proved by the boulder clay which it deposited ; but the Glasgow ice had disappeared so long before the first arrival of man that the rivers had already carved the boulder clay into rounded hills or drumlins separated by wooded glens. These hills were being cut back by tidal ebb and flow in the estuary, and the stones washed out of the clay were spread out as a broad bed of sand and shingle which now forms the river-side

plain through Glasgow. In Roman times, on the contrary, the levels of land and sea were apparently identical with those of the present time, and the physical geography of Scotland was the same as it is to-day. As there has been practically no change in the topography during the past 1800 years, the great changes which occurred between the Neolithic Age and Roman settlements indicate that the original foundation of Glasgow was several thousands of years B.C.

The Prehistoric Canoes.—The canoes,¹ of which at least eighteen have been found, throw much light on the condition of early Glasgow. The first was discovered in 1780. In excavating the foundations of St. Enoch's Church, a canoe was found containing a polished greenstone axe which has been often regarded as evidence of the Neolithic Age of the canoe. Two groups of five canoes were found on the southern side of the Clyde, one group at Springfield, opposite the lower Broomielaw, and the other five a little farther west at Clydehaugh. The second of the Springfield group is in the Hunterian Museum. It was found 20 feet below the surface; it is 20 feet 9 inches long and 30 inches deep; the width increases from 2 feet 9½ inches at the centre to 3 feet 6 inches at the stern. A hole near the bow was probably used for a mooring thong. Ridges were left in the canoe for seats. The boat may have been driven by single-bladed paddles, held free as in a Canadian canoe; but some vertical holes drilled in the rim suggest that each paddle may have been tied to a peg. One of the Springfield group had a plug of cork, indicating some intercourse with Spain. The other canoes were found at Point House, 80 yards west of the mouth of the Kelvin; at Bankton; near Clydehaugh; in London Street; in Jackson Street, Stockwell; at the foundation of the Tontine at Glasgow Cross; at Drygate, behind the new prison; and at Erskine Ferry.²

The occurrence of the canoes as far from the present river as Drygate and the Cross, and as much as 22 feet above present high water level, shows that the site of Glasgow up to the 25-foot contour was then occupied by water. The Clyde estuary then covered Argyle Street and the Trongate on the northern bank, and Govan, Eglinton Street, and Polmadie on the southern bank, and it probably narrowed to about its present width six miles above Glasgow bridge, between Newton to the south and Broomhouse to the north.

The Clyde at Glasgow was then bordered by rounded mounds or "drumlins" of boulder clay, which, after the emergence of the land to its present level, formed dry wooded hills overlooking the sandy swampy plain beside the Clyde. There are about seventeen well-developed drumlins north of the river, between Partick and Tollcross, and about twenty on the south of Glasgow between Govan, Pollokshaws, and

¹ The canoes have been generally regarded as Neolithic. Mr. Ludovic Mann tells me that he considers them not earlier than the Bronze Age, and he explains their occurrence in the raised beach as due to sinking in channels cut through the Neolithic gravels.

² For an account of the canoes, see *Glasgow Past and Present*, 1884, vol. ii. pp. 342-367. A sketch made in 1852 of one of the Clydehaugh canoes is reproduced in MacGeorge, *Old Glasgow*, 1880, p. 250. The stone celt found in the St. Enoch's canoe is figured in Wilson, *Prehistoric Annals of Scotland*, 1863, vol. i. p. 53.

Rutherglen. The valleys between these drumlins afforded shelter, and down them flowed perennial streams which gave water power that was subsequently used for mills. The original Glasgow stream, the Molendinar Burn (Plate I.), means "the miller's burn" (cf. Fig. 2). Glasgow has subsequently covered and obscured the drumlins, of which one of the best preserved is Gilmorehill, now crowned by the University.

The chief drumlins, the area covered by water at the date of the earliest settlement, and the sites where the dug-out canoes were discovered are indicated on the sketch-map (Fig. 1).

The Bronze Age.—The Neolithic fisher-folk of Glasgów were succeeded, probably after a very long interval, by the people of the Bronze Age, who erected massive stone monuments. Stonehenge, the cruciform avenue of standing stones at Callernish in the Lewis, and the Pictish towers or "brocks," are the most elaborate British representatives of these structures. Though the Glasgow area includes no monuments of equal rank to those, and no undoubted artificial trilithons, many standing stones, such as those near Strathblane, the burial mounds or tumuli near Pollok House and on the Cathkin Hills,¹ and the remarkably fine example of the cups and rings engraved on the rock at Edenbarnet, are religious relics of the Bronze Age people.

The Roman Period.—The sacred stones of the Bronze Age date from many centuries B.C.; but the traditional history of Glasgow begins in the fourth century A.D., with the reported residence of the Christian missionary, St. Ninian of Galloway, on or beside the site of the Cathedral. By Roman times the plain of shingle that had been laid down in Neolithic times on the floor of the estuary had been uplifted into the meadowland that now forms the level ground along Argyle Street and the Trongate. This tract of "haugh" was probably wet and swampy so the Celtic village was established on a drier site beside the Molendinar Burn.² It was probably there before St. Ninian, though it may have been small compared to the settlements at the neighbouring Roman stations. The Romans for a while occupied the Glasgow district; Agricola in 80 A.D. built a camp on Barr's Hill, near Kilsyth, 10 miles to the north-east; while Antonine's Wall, through Kirkintilloch, Bearsden, and Duntocher, passed 4 miles to the north. The Roman port on the Clyde was farther west, near Bowling, for Glasgow was not a Roman town. If the popular belief in the Roman origin of the old bridges at Duntocher, Bothwell, and Cathcart were valid, a Roman road would have traversed Glasgow, and crossed the Clyde at one of the local fords; but these bridges, like the "Roman Bridge" at Lanark, belong to the middle or later part of the seventeenth century.

That Glasgow dates from before the time of St. Ninian is probable, since the origin and meaning of its name have been lost in antiquity. The numerous interpretations that have been suggested, such as Claishdhu, the Dark or Grey or Green Glen, Glas-coed, the Dark Wood,

¹ Mr. Ludovic Mann tells me that the tumuli at Pollok and on the Cathkin Hills belong to the Bronze Age and those on Craigmaddie to the Neolithic.

² The position of the settlement is well seen in Barry's map (No. 4). See also Fig. 7.



Glasgow January 24th, 1704. W. St. John
A View from the South on the East side of St. Mungo's Church

and others, including the Beloved Green Place, the Blue Water, the Green Field, the Sacred Glen, the Beloved Water, the Black Church, and the Grey Smith, are uncertain etymological guesses. The name Glasgow is doubtless based on a Gaelic term better descriptive of some feature of the early village than the name Beloved Green Place is of the modern city.

Episcopal Glasgow, 500-1690.—The definite history of the city begins at the end of the sixth century, when St. Mungo or St. Kentigern settled on the traditional site of St. Ninian's cell, built a church, and founded a bishopric. The founder of historic Glasgow died on the 13th of January 603. Owing to his influence Glasgow developed as an ecclesiastical settlement around the church. Glasgow had the advantages that it was accessible from most parts of southern Scotland by tracks through strath or over moor, and by boat from all the Western Isles, while it was sufficiently far up the Clyde and protected by shoals to be moderately safe from Viking raids. It became the leading Scottish centre of Christian culture, doubtless helped by intercourse with Ireland, then the home of, at least in Geography, the most advanced scholarship in Europe. The population, however, remained small, and the town during this period was of secondary political importance. The capital of Scotland was at Dunstaffnage, beside the mouth of Loch Etive, near Oban, till in 843 its symbol of authority—the Sacred Stone of Destiny, now the Coronation Stone at Westminster Abbey—was removed by Kenneth MacAlpine to Scone, three miles from Perth. Meanwhile, in the seventh century, Edinburgh had been founded by Edwin, King of Northumbria, practically as an English outpost. It was recovered for Scotland, but it was too exposed in the Border country to be safe, and was only chosen as the capital after the murder of James I. in 1437. Perth remained the coronation city till after that of James IV. in 1488.

Glasgow, during this disturbed period, enjoyed the seclusion and security of an ecclesiastical town, ruled by its Bishop or, after 1492, by its Archbishop. The first Cathedral (destroyed by fire in 1189) was built between 1124 and 1136, when the bishopric was re-established; the diocese included south-western Scotland, from the Clyde to the English border, excepting Galloway. The town was constituted a burgh between 1175 and 1178, and at the same time the jurisdiction of the Bishop was confirmed, and successive charters enlarged his secular powers. Glasgow Castle was the home of the Bishop, and he appointed Provost and Magistrates. The episcopal control was gradually relaxed in practice, but it was not until 1611 that the first charter was granted by the Crown direct to the Provost; and it reaffirmed the power of the Archbishop to appoint the city authorities and collect the city dues. It was not until 1690, in the reign of William and Mary, that the citizens received the right to elect their Provost without the intervention of the Bishop, and Glasgow at length became an independent civil burgh.

The ecclesiastical government of Glasgow was of fundamental importance in its history and in that of the religious development of Scotland. After the death of Jocelyn in 1199 the Archbishop of York

asserted his jurisdiction over Scotland. Glasgow successfully resisted this claim, and secured from the Pope the decision that the Scottish Church was distinct from the English, and was directly under Rome. The church erected in Glasgow as the new Cathedral became the finest ecclesiastical building in Scotland. But the most important contribution of the Glasgow bishops to the progress of Scotland was the establishment in 1451 of Glasgow University by a bull secured from Pope Nicholas v. through the influence of Bishop Turnbull.

The ecclesiastical city was surrounded by rapacious burghs. Rutherglen to the south-east, Renfrew to the west, on the south of the Clyde, and Dumbarton farther down the river, on the northern bank, all seem to have been jealous of Glasgow, and they claimed the right to tax its trade. Glasgow was protected from its neighbours by the charters of 1226, which limited Rutherglen to a toll at Shettleston, and of 1275, which prohibited interruption by Dumbarton with Glasgow's free outlet down the Clyde and passage to Argyll. The city, however, in spite of its religious and scholastic eminence, remained small as regards population. At the latter part of the fifteenth century its inhabitants numbered only 2900; by 1556 they had increased to 4500, but it was then only the eleventh town in Scotland. In the seventeenth century it made quicker progress; the population at an enumeration in 1600 was 7000; it doubled between then and 1660, when it became, as stated in Ray's *Itinerary* (1661), the second city of Scotland.

The Glasgow Bridge.—The upgrowth of a market town beside the Cathedral, along the present High Street, followed the erection of a bridge across the Clyde. So long as the chief industry was fishing, and the people all had canoes, they lived in groups of huts along the river; but the construction of a bridge concentrated settlement between it and the Cathedral on the ridge west of the Molendinar Burn. Glasgow therefore developed as a bridgehead town. A wooden bridge is mentioned in 1285; the first stone bridge, of eight arches, and wide enough for pack-horses, was built either by Bishop Rae about 1339, or by Bishop Glendonwyn between 1408 and 1425 (see also Plates IV. and V.).

The Navigation of the Clyde.—The bridge therefore primarily determined the position of Glasgow, but the Clyde for long contributed very little directly to the development of the city, as it was of no use for navigation. Up stream the river was obstructed by rapids and waterfalls; down stream were shoals, too shallow even for mediæval coasting vessels. The first effort to open the Clyde from Glasgow to the sea was in 1566, when a labour force from Glasgow, Renfrew, and Dumbarton camped for weeks beside the river and tried to cut a navigable channel through the Dumbuck sandbank. This effort was unsuccessful. The seaport of Glasgow, until 1658, was Irvine, on the Ayrshire coast, whence goods were brought by barge or road. In 1658 the magistrates of Glasgow tried to buy ground at Dumbarton on which to establish a more convenient port. Dumbarton refused to sell land from the fear that "the great influx of mariners and others would raise the price of provisions to the inhabitants."

Glasgow being thus unable to secure a suitable harbour on its own

side of the Clyde, purchased 13 acres opposite Dumbarton on the southern bank, and established there Port-Glasgow, and the first Scottish graving dock. The new port at the time proved a failure, and the growing commerce of Glasgow led to efforts to improve the Clyde. A quay was built at the "Broomylaw" in 1688, but the river was too shallow to make it of real service. The first definite scheme to improve the Clyde was that of Smeaton in 1755. He proposed to build a lock at Marlingford, four miles below Glasgow Bridge, so as to secure $4\frac{1}{2}$ feet of water at Glasgow quay at all states of the tide. If Smeaton's policy had been adopted the city quays would have been useful to lighters discharging cargoes, but no ships could have reached Glasgow. The question was fortunately reinvestigated by John Golborne of Chester in 1768 and by James Watt in 1769. Golborne had introduced the system of making rivers scour out their own beds by confining the current between jetties; he thought it would be possible by restricting the channel of the Clyde, by ploughing the shoals, loosening the bed, and dredging, to secure four feet of water at the Broomielaw even at low tide. In 1773 Golborne's method was adopted, and he was given a contract to make a passage 6 feet deep and 300 feet wide through the Dumbuck shoal. His work was so successful that he deepened the channel 10 inches more than was specified, and he was given £1500 above his contract price. Rennie, in 1799 and 1809, extended Golborne's system; the natural scour continued to deepen the channel, and by continuous work throughout the nineteenth century the Clyde has become navigable for large ocean-going vessels, and Glasgow has become a great seaport.

The navigable Clyde is, however, essentially artificial. "Probably," says James Deas (*The River Clyde*, 1876, p. 1), "for no river in Britain has so much been done 'by art and man's device' as for the river Clyde above Port-Glasgow. In fact, from a mile below Bowling upwards to Glasgow, a length of 12 miles, the Clyde of the present day is nearly as much an artificial navigation as the Suez Canal. It requires constant dredging to maintain its depth; and the ever increasing size of the vessels of the mercantile navy necessitates the continued deepening of the river, to enable the navigation to keep pace with the demands of the shipping trade. Even so recently as one hundred years ago the river was almost in a state of nature, and was fordable on foot at Dumbuck Ford, more than 12 miles below Glasgow." High water, according to Deas, had in 1876 become 10 inches higher than in 1853, and low water 8 feet lower, owing to the improvement in the channel allowing the tide to ebb and flow much faster. Smeaton's lock system was fortunately not introduced at the time; but owing to changed conditions, the idea of locking the Clyde below Glasgow is now under discussion for a different purpose.

Glasgow as a Commercial Capital, and the Geological History of the Clyde.

—The change in Glasgow ideals from an ecclesiastical seat to a vigorous commercial centre is exemplified by the abbreviation of its city motto. Its original form, "Let Glasgow Flourish by the preaching of Thy Word," was not officially abridged to "Let Glasgow Flourish" until 1866; but

towards the end of the seventeenth century Glasgow adopted methods of securing prosperity and an attitude to negro slavery which were hardly consistent with the spirit of the Word. The establishment of the Trans-Atlantic colonies and the rise of English power in India led Glasgow to pay more attention to foreign commerce, and "The Company of Scotland trading to Africa and the Indies" was established in 1695. Glasgow owes its special advantages for Trans-Atlantic trade to the geological structure of Britain. The older and harder rocks occur on the western side of the country, and the softer younger rocks lie to the east. As the older rocks are the more resistant, the mountainous districts of Britain are to the north and west. The hills, generally speaking, have their steeper slopes to the west, and a longer gentler declivity eastward to the North Sea. Accordingly, the chief rivers flow down the eastward slope, while those discharging westward are mostly short and broken. The eastern rivers have deposited at their mouths such quantities of silt that the English eastern estuaries are mostly small; except for those which have been made artificially, they are generally useless to large modern vessels. The Thames having been revived by recent geological changes, is the chief natural port on the eastern coast. The western coast, on the other hand, has abundant harbours, but, though they are excellent, the country behind them is generally of inferior value. The three western harbours which flourished by developing the Trans-Atlantic trade are Bristol, Liverpool (which superseded Chester owing to the shoaling of the Dee), and Glasgow. Some other western harbours, such as Fishguard, have been utilised later.

The advantages of Glasgow as a western port are due to the remarkable geographical history of the Clyde. Its sources were no doubt originally in the Argyllshire highlands to the north-west of Glasgow.¹ Its head streams flowed over a plateau which, at the height of about 1000 feet about present sea level, covered the Firth of Clyde and the lower Clyde Valley. The plateau sloped gently downward to the south-east and its streams converged in the district south of Lanark, whence the Clyde passed through the existing wind gap at Biggar, and continued eastward down the Tweed Valley. It flowed south of Peebles through a channel now filled with glacial deposits, and continued to the North Sea through the lower Tweed. Later on, by the combined effect of rapid erosion by the swift western streams and of earth movements which broke up the Western Highlands, the original head streams of the Clyde-Tweed river were discharged through the Loch Long Valley to the Firth of Clyde. A young and active river which drained the Renfrew plateau to the Firth extended its head stream eastward and at length captured all the former tributaries to the Tweed west of the Biggar Gap; and the Clyde became the chief British river flowing north-westward. The growth of the Clyde formed a fine natural harbour below Dumbarton, which serves as the natural outlet for Strathclyde and the western part of the Midland Valley of Scotland.

¹ Cf. H. M. Cadell, "The Dumbartonshire Highlands," *Scot. Geog. Mag.*, vol. ii., 1886, pp. 337-347.

Acceleration of Glasgow's Progress.—1. *The Union.*—The results of the commercial efforts of Glasgow in the seventeenth century were disappointing. Port-Glasgow proved at the time a costly failure, and the population of the city in 1708 was still only a little over 12,000. The geographical conditions were then unfavourable, for the adjacent country, from its remote northern position and its wet climate, was agriculturally poor. Scotland was then still excluded from trade with the English colonies, and its own colonising attempt in Darien had proved a tragic disaster. A brighter future was opened by the Union of the Parliaments of England and Scotland in 1707. This step was at the time most bitterly opposed in the city and provoked violent local riots.

2. *The Trans-Atlantic Trade.*—The Union made the English colonies British and admitted Scotland to a share in their trade. Glasgow promptly took an active interest in tobacco and sugar. The manufacture of sugar-mill machinery is still a leading Glasgow industry, and the names Jamaica Street, Virginia Street, and Plantation Quay recall the early imports of sugar, rum, and cotton.

On the introduction of cotton, unlike Lancashire, where the cotton imported at Liverpool has to be carried inland for manufacture, the moist climate, excellent water, and abundant power in the immediate proximity of Glasgow led to the establishment of local cotton manufacture and printing.

The growth of the West Indian and American trade transferred the centre of Glasgow from the precincts of the Cathedral and the High Street to the next glen on the west. The names of the streets bear witness to the new interests that accompanied this change of position, as may be seen by comparing the successive maps of Glasgow in 1650 (Map 6), Ross's map of 1773 (Fig. 7), and Fleming's map of 1808 (Map 5). Around the Cathedral are such theological titles as John Knox Street, Ladywell Street, and Ark Street, and those named after primitive trades, Candleriggs, the Salt Market, Weaver Street, Shuttle Street, and Mason Street. The chief thoroughfare of the new commercial city was Jamaica Street; at least four have been christened India Street; and Havana Street is reminiscent of the fortunes made from West Indian tobacco.

Glasgow as a Mining and Metallurgical Centre.—By 1763 the population had grown to 28,300. A still more rapid growth shortly after that date followed the development of the coal and iron fields in Lanarkshire. Coal had been worked on a small scale in Scotland since the fourteenth century; but it was only on the development of the iron manufacture that full use could be made of the coal, thereby laying the foundations of Glasgow's industrial importance. Imported iron ores had been previously smelted in the west of Scotland, as along Loch Fyne and Loch Maree. With the exhaustion of the local firewood the industry ceased, but it was started again with charcoal fuel in 1750. In 1760 the famous Carron Works near Larbert founded the modern Scottish iron industry, and in 1782 the Clyde Iron Works were established in the suburbs of Glasgow. From this time forward the city grew rapidly. The population, in the decade 1780 to 1791, rose from 42,000 to 66,000, and this growth was the beginning of the great increase during the

nineteenth century. For this development Glasgow is indebted not only to its local mineral resources, but largely to the inventive genius of its citizens. Glasgow has played a leading part in the development of many modern industries. The iron manufacture was stimulated by the discovery by Robert Mushet in 1801 of the blackband ironstone, which was worked with special ease as it is a self-smelting ore. In 1828 Neilson introduced the hot-blast, which, by its great economy of fuel, was one of the epoch-making discoveries in the metallurgy of iron. Meanwhile Glasgow had given to the world the still more momentous invention of the steam engine, for it was on Glasgow Green, while thinking over the repair of a model Newcomen engine belonging to the University, which is still in the Hunterian Museum, that Watt thought of the separate condenser, and thus made the steam engine a practicable machine. An almost equal advance in the development of steam was made by the further economy in its use achieved by John Elder's triple-expansion engine. Watt's steam engine was applied by Henry Bell in the *Comet* to shipping. Thus the Clyde was the first river in the Old World to be navigated by steam power. Since the days of Bell's *Comet*, shipbuilding and marine engineering have continued to flourish on the Clyde till, thanks to the initial impulse of Watt and Bell, and to the association of one of the finest harbours on the Atlantic with a rich and easily developed mining field, Glasgow has become the greatest shipbuilding centre in the world.

Geographical factors have controlled each of the main stages in the development of Glasgow: its foundation as a prehistoric fishing village, its influence while a mediæval bridgehead, and its modern expansion as a Trans-Atlantic port and industrial centre. With fine insight Glasgow was selected by St. Mungo as the chief centre for the Christianisation of the country, and by Bishop Turnbull six centuries later as the chief educational centre for Western Scotland. Subsequently, when political changes enabled Scotland to share in the rising Trans-Atlantic trade, Glasgow became a port and was able to use to the full the rich mineral resources of the adjacent coal-fields. Its commercial and industrial activity gave Glasgow cosmopolitan interests, which it combined with the philanthropic zeal and intellectual interests inherited from St. Mungo and Bishop Turnbull. It was in accordance with Glasgow traditions that David Livingstone began work as a missionary before he became one of the world's great geographers and the pioneer of British administration in Southern Equatorial Africa. The spirit of modern Glasgow may be traced to three streams of influence: the Cathedral, the University, and the character of its commercial leaders as typified by Bailie Nicol Jarviè. The combination of these influences inspired such noble adventures as the African Lakes Corporation, the Stevenson Road, the establishment of African industrial missions and the calling of the Kikuyu Conference, and also led to the hegemony of Glasgow in municipal enterprise. To the same influences may be traced the sincerity, originality, and intellectual independence of the citizens, qualities nourished during long development in the isolation of the most north-westerly of the great cities of the Old World.

THE PEOPLE OF GLASGOW.

By Professor T. H. BRYCE, M.A., M.D.

LIKE every great city Glasgow has drawn into its busy life all sorts and conditions of men, and its present-day population is of a very mixed character. Geographically it is, and has always been, the nucleus of a sphere of attraction which comprises the greater part of the Western Highlands and Islands, as well as the Lowland western shires. This has from a remote period determined the basal stratum in the population, and the physical characters of the majority of the inhabitants. But her commercial and industrial supremacy has attracted to Glasgow citizens from every part of the United Kingdom, and foreign elements of all sorts have filtered into the population. There has necessarily been a steady process of fusion and assimilation going on which has tended towards the production of uniformity in physical type. But the same tendency towards uniformity is seen in every part of the country. Facilities of transport have in modern times greatly increased the fluidity of population, and types are more evenly distributed. It is remarkable, notwithstanding, how certain physical characteristics seem to cling to certain areas, and how in spite of admixture physical types persist and are perpetuated.

The nature of the environment also appears to have its effect in neutralising the character of a city population. It has been shown how in towns situated in districts where fair and dark elements are placed in juxtaposition, the urban population is darker than the rural. City life does not seem to suit the blond types so well as the dark. Further, where the general population consists of a mixture of round-headed and oval-headed people, it would seem that in the urban population the oval-headed elements are proportionally more numerous. The average stature also tends to fall in cities.

While these facts have to be borne in mind, and due allowance made for them, the sequel will show that in the mass the present-day population of Glasgow, especially if we include the surrounding districts, has remained, to a greater extent than might be expected, true to the characters which were determined by its geographical position and historical development.

All the races of Europe, physically considered, are different blends of the same primitive elements. It would appear that when the primary movements, as they may be termed, of population had come to a close, and certain blends had consolidated into racial groups, types became more or less fixed. These types then underwent further development and modification, each in its own particular area. This is true even within the several larger areas. Local types were established and still persist, more especially of course in isolated districts which offer few inducements for immigration. In this country the last half-century has seen a vast shuffling of the population. Local groups are becoming more and more broken up and altered in aspect by admixture.

The impression received by an ordinary observer in regard to the population of Glasgow at the present time is that we are not a tall people. Stature varies greatly, and there are many individuals over the average height, but on the whole our inches are no more than the average. Complexions on the whole are dark, not fair. Hair of the darker shades of brown passing into black is very common. Red hair is not frequent, and very fair hair is rare. Heads are almost uniformly oval, the faces long, and without special projection of the cheek bones.

Such statistics as are available generally confirm this impression. The tables published by the Anthropometrical Committee of the British Association and by Dr. Beddoe, as well as those for school children collected by Messrs. Gray and Tocher, indicate that there is a marked degree of darkness. While Glasgow appears distinctly lighter in complexion than the counties of Argyll and Inverness, it is darker than any of the eastern counties. The vast majority of the inhabitants are of course mixed types in respect of pigmentation as determined by hair and eye colour. The statistics show that all over Scotland the majority of the inhabitants have hair of some shade of brown—lighter or darker. The actual percentage in any given area is determined by the proportion of individuals with fair hair (flaxen, yellow, or red), and those with pure black hair without any tinge of brown. In certain districts the fair-haired persons occur in larger numbers, and a reduction in the percentage of the brown traits is chiefly due to increase of the blond traits. The distribution of light and dark brown hair varies in different localities. In the Glasgow area the darker-haired individuals bear a larger proportion to the total population than they do in the eastern and northern parts of Scotland, and of the towns of the country it is distinctly the darkest. If a comparison is instituted between the prevalence of pure blond and pure brunette types, it will be found that the percentage of pure brunettes is larger in the West than it is in the East. It is to be expected, of course, that dark eyes should be associated with dark hair, and in the general order of things this is so; but in the western districts a prevalent combination is that of light or grey eyes with dark hair. This is particularly a Celtic feature, and is widespread in West Scotland, and also in Ireland. All available statistics indicate a preponderance of light and grey eyes in Glasgow. It may be plausibly attributed to the early racial mixture which will be defined below, but the possibility that the lack of development of pigment in the iris may be due to the environment must not be altogether overlooked.

The statistics of pigmentation, such as they are, have thus demonstrated that the West of Scotland is darker than the East, and that the darker traits are in greatest preponderance over the Western Highlands in the counties of Argyll and Inverness. Records regarding head-form also show that heads are slightly longer in proportion to their breadth in the West.

An extensive series of skulls, which dates from about one hundred years ago, has shown us that in respect of head-form the inhabitants of Glasgow of that date were very homogeneous. The length of the head from before backwards is great in itself, and great also in proportion to

the width. The skull has therefore a long oval shape, and the back part or occiput is full and bulging, so that there is a relatively great length behind the ear. The vault rises fairly high; the forehead is full and broad; the face is long and oval in most instances; the ridges above the eyebrows are not specially projecting, nor the cheek bones prominent. In only one or two instances in the series referred to did the skull differ from the long oval type. It then belonged to the broad or globular variety of skull, in which the breadth is relatively great in proportion to the length, and the face is broad in proportion to its height from the root of the nose to the chin. People with heads of this type, which is the prevalent one in Central Europe, are not numerous in any part of Scotland, but seem to be least frequent in the West.

Such, then, are the general features of the population of Glasgow, and of the districts round about it. The prevalent type is a neutral one, and every variety and shade is to be met with, yet, taken as a whole, the area of which Glasgow is the centre has a character which at once distinguishes it from some other districts, say from Aberdeen and Aberdeenshire.

The place names of Glasgow and the surrounding district are mainly Celtic, with some superposition of Teutonic elements. It seems now generally agreed among Celtic scholars that all the Gaelic we have came from Ulster. The language previously used in the district was British, which differed little if anything from Welsh.¹ Thus the substratum of the earliest place names is British modified by the later influence of Gaelic. The importance of this fact in connection with the ethnology of the Glasgow area will appear as we proceed.

In this connection it may not be superfluous to point out that difference in language does not necessarily imply a difference in race, nor a change of speech a change in race. It may not even imply conquest by violence, or suppression by a ruling caste of strangers. In studying the evolution of the Scottish nation we have to allow more for the peaceful penetration of cultural influences than has generally been admitted. There has been less change of blood than the accounts of the older writers would lead us to suppose.

To comprehend the ethnography of Glasgow and the lower Clyde valley we have to go back into far antiquity, long before the time of written records.

The earliest trace of man's occupation of the site of the city carries us back an indefinite period into the remote past, to the time when a hunting and fishing population occupied the banks of the river and pushed their fortunes upon its surface in rude canoes dug out from the boles of trees by aid of fire and chisel, probably of stone. Quite a number of these ancient vessels have been discovered both on the north and the south sides of the river, deep below the present busy streets, and above the present high tide level (cf. p. 4). But we know nothing directly about the builders of these canoes. It is only when we have the chance of examining the human remains in ancient graves that we get

¹ Dr. Calder in *Glasgow Herald*, Jan. 31, 1920.

any light on the physical characters of the early populations. Further, the grave-goods—weapons, ornaments, pottery—give us the clue to the position in time and to the origin of these ancient races of which we have no written history.

From the evidence gathered from excavations of ancient graves and sites of habitation, we know that a people without knowledge of metals, and therefore still in their stone age or stone phase of culture, spread up the estuary of the Clyde from the west and south. The chambered tombs of these people still remain to witness their occupation of the Clyde area. Their rude stone monuments can be traced southwards on both sides of St. George's Channel to Western France, and a certain rude clay pottery of a distinctive kind associated with their remains can be followed in contemporary tombs as far south as the Pyrenees. The folk therefore must, we conclude, have come from the south. They were a branch of the Mediterranean race, and have been named the Iberians. They arrived many hundreds of years before the Christian era, but there is evidence to show that the country was occupied before their coming by an earlier people. In the absence of graves which can with certainty be related to an indigenous pre-Iberian people, we can only speculate as to what manner of men they were. We shall return later to this question. We have positive information about the Iberians. They were a short race of men with long narrow heads and high narrow faces. Although we have no direct evidence on the matter, it is probable from collateral evidence that they were dark in complexion, with black and perhaps curly hair. It is generally believed that they spread over the whole country, but their typical monuments are confined to the West and North.

We know that at a period nearly as remote, a second race reached Scotland from the South and East. They practised a different set of burial customs, and introduced the new art of smelting copper and tin to make bronze. Their pottery was quite different from that of the Iberians. On the whole their culture was an advance upon that of their predecessors, and it prevailed and replaced it. But all the evidence goes to show that the older race or races absorbed the newcomers. In short the new culture prevailed, but the older people had the best of it in the struggle for existence. These immigrants were of short or medium stature and were probably brunette in complexion, but perhaps not so dark as their predecessors.

Further, their heads were of a different shape, which gave them a different physical aspect. Their skulls were short in proportion to the breadth, their faces broad in proportion to the height. They came from Central Europe, where the type has persisted from the Stone Age to the present day. The race probably came from the East into Europe and took root in the Alpine region. It spread from this centre and forms at the present day an important ingredient in the population of France, Switzerland, South Germany and Northern Italy, and in all the Slavonic peoples. In Britain this Alpine element merged with the earlier population, and although the type persists among us to the present day, and has been an important factor in the racial mixture, it

was swamped by the apparently dominant Iberian strain. The round heads never reached Ireland in numbers sufficient to produce any permanent ethnic effect.

These Bronze Age brachycephals in all probability came over to Britain in successive waves. The first comers brought that type of pottery known as the Beaker urns. The Beaker men of the Scottish short cists were short in stature, but the round barrow men in the south were, on the average, fairly tall, or at any rate of medium stature. There are at least two types of round barrow skulls, only one of which agrees with our short cist skulls associated with Beaker urns. The pure Alpine type represented by these last probably suffered some alteration from admixture on the Continent.

Burials which can be assigned to the early Iron Age are very few in number. In one group of such burials the skulls were of several types. Some might have belonged to the dolichocephalic people of the chambered cairns; one corresponded closely in type with a skull recently discovered in a cist in Peeblesshire, which belonged to a man of 5 feet 8½ inches in height. He might very well have been one of the tall fair Gauls who, as we know, were crossing over into South Britain for some time prior to the Roman invasion. The fact that the grave in which the skeleton was found was native, not Gaulish, the rarity of skulls of this type, and the absence of Gaulish pottery from the Scottish area, all argue against the idea of any invasion and occupation of the country by Gaulish incomers, but single individuals or small groups may have developed on the spot, because, as we shall see, it is possible that the elements for the development of just such a mixed type existed in the local population.

By this time the British peoples had learned the arts of the early Iron Age. They were experts in metal work, and had reached a high level of artistic workmanship in bronze and iron. The new culture undoubtedly came from the Continent, but the evidence points to its introduction by way of trade rather than by racial conquest and immigration.

From the evidence sketched above we conclude that the inhabitants of Scotland, as the Romans found them, were a mixed race, resulting from the commingling of a primitive unknown substratum with the Iberian and Alpine immigrants. If we take account only of the physical traits of the Iberian and Alpine elements, we should be obliged to conclude, judging from the physical traits of the indubitable descendants of these stocks in the present-day population of Europe, that the early Caledonians were of medium stature and of dark complexion. It is most probable that in their spread northwards the Alpine people became both taller and somewhat lighter by admixture with blond Teutonic elements on the Continent, but they cannot well have been the men described for us by Tacitus. He tells us that the Caledonians were tall, large limbed, and rufous, and he concluded from their appearance that they were of German origin. But there is no archaeological evidence of any very early connections with Germany. The colour question apart, the chief difficulty in the problem is to account for the tall stature of the Caledonians, and consequently for the high average

stature of the inhabitants of Scotland in recent times. It has been attributed to the round-headed type of the Bronze Age by some, but the Alpine race, generally speaking, is of medium stature. It has also been referred to the later Gaulish immigrants, but, as we have stated, we have no evidence that they extended so far north in any numbers. Further, such evidence as we possess regarding the physical characters of the Romano-British population in England shows that they differed little from the earlier Iberians.¹ Huxley, to account for the statement of Tacitus, assumed a prehistoric infusion of a Germanic stock long before the date of the Saxon invasions of historical times, but again of this we have no evidence. For various reasons which cannot be fully detailed in this article, the writer believes that the most plausible theory to account for the facts, such as we know them, is that these islands were occupied, long before the Iberians appeared on the scene, by the same primitive substratum of the tall blond Nordic race as existed in all other parts of Northern Europe. The type was differentiated in the North in remote antiquity. It was indigenous, and the successor of still older types. It has persisted in the Teutonic peoples round the Baltic. It has been proved that it was the substratum in European Russia, but it was there submerged by the Slavonic round-heads, who were an Eastern offshoot from the Alpine stock. In Russia the Alpine type became the dominant factor in the racial blend. In Britain, on the other hand, the Iberian type became dominant over the Nordic, and later also over the Alpine type.

According to the hypothesis three elements entered into the pre-Roman population, and it is reasonable to suppose* that they were blended in different ways, in different parts of the country. The Iberian element was probably in the ascendant in the West and North, in the regions where we still find their rude stone monuments; the Alpine was probably present in larger numbers in the East, for Sir William Turner proved that there is, or rather was in recent times, a larger strain of brachycephaly in the eastern parts of Scotland. The Nordic element was very possibly more strongly represented in the Central Highlands.

Of the three elements in the racial mixture two, the Nordic and the Iberian, were dolichocephalic, and one, the Alpine, brachycephalic. In respect of head-form dolichocephalic elements prevailed over the Alpine brachycephalic element. In the matter of stature the Nordic element was tall, the Iberian short, and the Alpine short or intermediate. The tallness of the Caledonians was a Nordic contribution. In regard to pigmentation the Nordic element was almost certainly fair, the Iberian dark, and the Alpine probably brunette, but perhaps not so dark as the Iberian. In the resulting mixture—we may infer from the distribution of colour at the present day—the darker traits have prevailed in the hair colour; pure types blond and black have continued to be separated out; and if the pure blonds are generally in excess of the pure darks it has been due to later infusions of blond elements. In the matter of eye

¹ Boyd Dawkins' *Report on Glastonbury Lake Village*.

colour it would appear that the Nordic trait of a light eye has been a dominant factor.¹

In terms of this hypothesis the blend of physical characters which we see in the existing population was already established before the Romans arrived in North Britain. Since that date there have been re-distribution, and superposition, but no addition of any new fundamental characters. The Saxons and Scandinavians brought more Nordic traits, the Scots from Ireland more Iberian traits—the relative proportions and grouping of physical characters and racial features were altered, but the fundamental mixture has remained the same.

On the whole the inference seems justified that the Mediterranean element in the racial blend has been the most dominant and persistent one. It has been in contest, from the first, with the Nordic element and has held its own. In the lower Clyde valley it has always been a strong factor.

The people who occupied the regions round about Glasgow in Roman times were part of the tribe of the Damnonii. They lay within the Roman province and only a mile or two from the Roman wall. They must have come into intimate contact with the life of the wall, and with all this involved in the way of culture and civilisation. How far any Roman blood was introduced into the population we do not know, but it would not seem that the Roman occupation left any permanent ethnic effect.

The people of Strathclyde were, of course, Celtic in speech, and used the Cymric form of the language, as testified by the fact that the substratum of the place names is Brythonic. Like the Romano-British people in what is now the Principality of Wales, they were, we have every reason to believe, in the main a dark, dolichocephalic race of mediocre stature.

After the Roman power was withdrawn from Britain the province was assailed by Saxon invaders. The Saxons had harassed the eastern coasts for the last half-century of the Roman occupation, but when the legions departed the land was at their mercy. The Frisians and Angles now occupied the Lothians, and the kingdom of Bernicia was founded. Meantime the Scots from Ireland occupied Argyll and the Isles, and set up the kingdom of Dalriada; but as they were, racially speaking, a kindred people, they brought no new ethnic traits into Scotland. Sometimes they acted as allies of the Britons against the common Saxon foe—sometimes as assailants. In any case, so closely to the Gaels did the inhabitants of the lower Clyde valley lie, that there must have been

¹ There is some evidence which indicates that eye colour, and probably also hair colour, in man follow Mendel's Law, and they seem, in some cases, to behave as separate unit characters. The case of head-forms is different. It may be considered proven that the distinction between the elongated and globular types of skull is a specific one, and that they represent contrasted characters in heredity. Treated statistically, the case of head-forms appears to be one of a blending of parental characters, like the variations in stature; on the other hand, the long persistence of types in spite of admixture suggests the possibility—the ordinary fluctuations within each class apart—that head-forms may behave in heredity like the colour traits.

considerable peaceful penetration of Gaelic elements. From these early days to the present time, Glasgow has been strongly recruited from the Western Highlands, and there has always been a considerable body of Northern Irish. In the writer's University class of the present session, largely drawn from the Glasgow district—when certain foreign and colonial elements are excluded—there are over 20 per cent. of men bearing names beginning with Mac, apart from the large number who possess other names of Celtic origin.

The history of Strathclyde for the centuries succeeding the evacuation of Britain by the Romans was a long struggle between Briton and Saxon, during which sometimes Saxon, sometimes Briton prevailed, but neither was completely overthrown. Political union between the Lothians and the kingdom of Cumbria or Strathclyde came about in 1057, when they were united with Scotia proper into one kingdom under Malcolm. His marriage with the Saxon princess Margaret may be taken as symbolic of the process of racial union, which had been proceeding, and which in a considerable measure influenced the Clyde valley. This is witnessed by the lighter tint in maps of pigmentation over the counties of Ayr, Lanark, Renfrew, and most of Dumbarton as compared with the darker tint in Argyll and Inverness, where there can have been little or no infusion of Saxon blood. But the identity of the local groups was preserved for some time. At the battle of the Standard in 1138 the Cumbrenses and Tevidalenses formed a separate body in the army of David I., from the Loudonenses or men of the Lothians. It is to be noticed, however, that now the men of the Lennox were brigaded with the Islesmen, not with the more southern representatives of the old kingdom of Strathclyde.

From the year 793 to 1263, when their power was finally overthrown at the battle of Largs, the Northmen harried all the coasts, and in some districts, as witnessed by the place names, extended far inland. They brought much of the West and the Isles under their dominion, but the immediate vicinity of Glasgow was not affected. In the outlying islands, as well as the extreme north, Scandinavian types are still to be recognised. Norse blood has entered largely into the racial blend in these districts, and, in so far as the Isles have contributed to the population of Glasgow, a certain trace of this element must be admitted.

Some of the best blood in Scotland is, of course, Norman in origin, as many of our most honoured national names proclaim. But the Norman strain, being of Nordic origin, had no effect on the physical traits, and, besides, it was represented only by a ruling caste.

In the West to-day the ancient blend of Iberian and Alpine races, with the Iberian as the dominant, is in the majority. Primitive British blood still flows in measure in the veins of those who dwell round the old cathedral of our patron British saint.

A final question, which has often been asked but is difficult to answer, certainly may be put:—Is the shorter darker Mediterranean type prevailing in the British Islands as a whole over the taller and fairer Nordic type? Is the Iberian-Alpine Celtic element submerging the Anglo-Saxon by a slow biological process? The answer to

these questions is of interest and importance, if there be any truth in the association of certain psychological traits with particular physical characters.

THE CATHEDRAL AND BISHOPRIC.

By Dr. GEORGE NEILSON.

GLASGOW became a cathedral city possibly because at the junction of the Kelvin and the Clyde there was a manorial residence of the Kings of Cumbria. The shrine of St. Kentigern was within a couple of miles of the abode of King Rydderch. From the first there was an intimate connection with royalty, a sort of mutual dependence, which was a continuing feature of the institution and was favourable to the public authority of the prelates who held the see. The visionary promise to Kentigern that the community would grow into a "great people" was not accomplished all at once, and was after five centuries not yet hastening to fulfilment. Even such possessions as had gathered round the saint's little church on the Molendinar (more anciently spelt Molyndoner) had in Prince David's time, before he came to the throne of Scotland, shrunk to a few scattered lands and churches. Authentic history begins with the cathedral, when David, not yet monarch, determined towards 1116 to restore the see. The famous "Inquest of David" gathered up the fragments of its traditional possessions and was an eloquent enough appeal to the most profuse of royal patrons.

David's generosity had another impulse in the fact that Bishop John, consecrated in 1115, had been the prince's tutor. If a Dunfermline charter is not misleading, he may have held office as chancellor, the highest official dignity under the crown. This combination of ecclesiastical and secular authority was to be recurrent throughout the history of the bishopric. David manifested, both as prince and king, an unstinted goodwill which probably went far to repair all the losses the successors of Kentigern had sustained in the dark centuries. Before 1124 he made a grant of 100 shillings of land to build and restore the church, and one chronicler assigns to him all the honours of its erection. On its dedication day in 1136 he gave to the bishopric part of the lands of Partick which he had leased to the archdeacon: doubtless including what had been the residence of his royal ancestors. Subsequently he added to his gifts the extensive parish of Govan across the Clyde from Partick, another slice of Partick, the church of Cadzow, and the teinds or tenth part of the "Can" from Strathgryfe and Cunningham, Kyle and Carrick, besides an eighth of all his fines or pleas in the great province of Cumbria. Glasgow, as the bishop's seat, was made the head of a secular territory almost coextensive with the diocese itself. It included a vast area of moorland and mountain, a wild forest from Clydesdale to Galloway and the Solway, and was indeed a princely endowment such as might well prompt the criticisms of a needy inheritor of the crown, some centuries later.

Intimately associated with these endowments were the great feudal grants made to the Steward of Scotland, Walter, son of Alan, first by King David and afterwards by his grandson Malcolm the Maiden. David's grant may be reckoned as substantially Renfrewshire, to which in 1161 Malcolm added the portion of Partick which David had kept in his own hands. The manorial area thus severed from the crown extended from an unascertained line east of the Kelvin as far down the Clyde as Yoker, opposite the town of Renfrew, where Walter, the son of Alan, had his first dwelling on a site still indicated by the remains of the mote or mount of Castlehill. The Steward's territories were for a considerable distance bounded by the lands of the bishopric. The gifts to the see determined the limits of the stewardry. Probably also the trading bounds of the royal burgh of Rutherglen, the creation of King David, had to steer clear of trespass on the territory of St. Kentigern.

Most notable of all external events of the locality in early times was the plundering raid which the kinglet of Argyll, the famous Somerled, made in 1164. Presumably he represents the mingled forces of the half-Gaelic, half-Norse shipmen of the West Coast and the Isles, and certainly his expedition caused grave commotion in the valley of the Clyde. He made good his landing at Renfrew, but the energetic Bishop Herbert summoned his men, and a swift movement intercepted the invaders at Renfrew and cut them to pieces, Somerled himself being slain and his son Gellicolan drowned in an effort to re-embark. A remarkable poem which tells of this triumph of St. Kentigern and the "Saints of Scotland" was the work of a priest of the bishop's household—a fiercely pious story not badly told, one of the foundation documents of Scottish literature.

Onward from this time the position of bishop would seem to have steadily risen both ecclesiastically and politically. William the Lion's charter in 1176 was the first great sign of this: it authorised Bishop Jocelyn to have a burgh at Glasgow with all the franchises appurtenant. This vital institution was accompanied or immediately followed by the opening of a scheme for the building of a cathedral church, in room of the edifice of Bishop John, which had been destroyed by fire. Bishop Jocelyn had a long task before him, but his scheme both financially and architecturally was to be accomplished in his lifetime. The *Chronicle of Melrose* reflects the joy and pride of the clergy of Scotland in its note that in 1181 Jocelyn had gloriously enlarged the church of St. Kentigern, and that in 1197 the new cathedral church which he had erected was dedicated, although the structure was then only completed in a first phase.

To the same period falls to be assigned the acquisition by the diocesan authorities of a remarkable book, the "Pontifical" of Glasgow, a beautiful and dignified formulary of church services and ceremonies, such as the dedication of churches, ordinations of priests and professions of subjection to the mother church of Glasgow, as well as the ritual of ordeal and duel. Written originally for the diocese of Canterbury, this magnificent example of penmanship, dating probably about 1180, was

PLATE II



A View of Vienna from the
Peterskirche

skilfully adapted to Glasgow by erasing "Dorobernensis" and substituting "Glasguensis" in the text. The volume is now in the British Museum, outliving by six centuries the new Cathedral of 1197, of which only a single pillar-shaft in the crypt remains. Another very creditable documentary property from that early time still exists also in the *Registrum Episcopatus Glasguensis*, or chartulary of the bishopric, containing charters, papal bulls, and important muniments. The editing of this fine record in 1843 by Cosmo Innes was a model performance, which did honour to the Bannatyne and Maitland Clubs which produced it. The *Registrum* itself is now at Blairs College, Aberdeen. The writer of this article was one of a little group of three who were privileged nearly thirty years ago to examine this *Registrum Vetus* in the hands of the venerable Archbishop Eyre in Glasgow, to whom it had been sent from Aberdeen for the purpose. The sole possession of the see still in the custody of the ancient faith, the chartulary, then seen by the courtesy of the stately old Archbishop, was a remarkable symbol of ecclesiastical history. Its execution and the comprehensive selection of its contents attest a practical spirit of order in the conduct of diocesan affairs. The Cathedral library was a most respectable collection, and the catalogue drawn up in the time of James I. must have been made by a librarian of sound equipment. A historian, however, was not forthcoming, and the "Breve Chronicon" engrossed in the *Registrum* is the merest compilation from Bower's *Scotichronicon*.

The thirteenth century found the bishopric a compact and well-administered diocese which, through political causes, especially a connection with royalty and the government, had acquired a leading influence among the high ecclesiastical forces in the realm. It had come to be associated with royal patronage bestowed for reasons of state. No wonder that the outskirts of the city became a barony and regality under the bishopric. Not fewer than eight of the bishops were chancellors of the kingdom, and a ninth, the famous John Cameron, was the king's secretary. The bishopric was thus very nearly the top-round of the ladder of political promotion, a fact which explains a certain public quality in the successive prelates as well as a distinct standard of skilful administration.

Returning to the thirteenth century, we see that as the Church developed the cathedral structure responded to the ecclesiastical expansion, and an edifice far statelier than its predecessors was through the labours of Bishop Walter and Bishop Boudington rising on the site. Art, worship, and ecclesiastical dignity advanced together. Richly endowed, served by at least a dozen canons, having the customs of Sarum as the base of its constitution, the church, with its wonderful crypt, where Kentigern lay, and the massive but graceful columns and vaulting in the great choir of five bays above, was a noble cathedral which was still growing as the time required. A grave interruption was at hand. When Robert Wishart became bishop in 1270 the crisis was still distant, but the closing decade of the century was marked by the English usurpation and the at first ill-starred patriotic resistance. In this an essential—indeed it was thought at the time the main—inspiration came from the

Bishop of Glasgow, and, as events proved, even the Cathedral itself had an illustrious share in the struggle with Edward I. Without reserve the Bishop threw himself and all the resources at his command into the scale in support of John Balliol until he was "down and out," and then in support of Robert the Bruce against the aggressor. Bishop Wishart was a chief power behind both Wallace and Bruce in the national cause. English historians count up the number of times he forswore himself, the series of oaths of subjection to Edward I. he broke. Edward had more than once in 1301 made his devotions at the altar of St. Kentigern, as well as at the great altar of the Cathedral in the choir. When the final die was cast in 1306, and Bruce, after the slaying of Comyn, rode north towards Scone, the Bishop brought out from the repositories of the Cathedral a banner of the arms of the late King of Scotland, which he had long kept secretly in his treasury, and sent it to Scone for the coronation. (The treasury was one of the western towers which an ill-informed and fatal æstheticism doomed to destruction in 1846-1848). Moreover, the timber which the English monarch had given to the Bishop for the belfry of the Cathedral was said to have been diverted by the daring prelate to be used in the siege of the king's castle or peel of Kirkintilloch. These counts in the Edwardian indictment are now reckoned among the proudest memories of the War of Independence, chequered though they are by the Bishop's capture in arms, to be followed by imprisonment till Bannockburn was his ransom.

During the fourteenth century the national conditions did not favour cathedral building, although probably the nave of eight bays was completed, but in the fifteenth Bishop Lauder went on with the chapter-house and the central tower, which his successor Bishop Cameron completed with a spire; and to Bishop Blackadder, at perhaps the opening of the sixteenth century, are assigned the crypt or Aisle of Car Fergus and the rood screen. This may be reckoned the last addition to "St. Mungo's work," which, as the proverb has it, was "never done."

Another notable bishop was William Turnbull, whose great distinction was his diplomatic triumph not only with James II. but also with Pope Nicholas V. in procuring the foundation of the University of Glasgow in 1451, for which an example had been given at St. Andrews forty years before. The final touch of dignity to ecclesiastical institutions in Glasgow came in 1491, when a bull of Pope Innocent VIII. raised Glasgow to an archbishopric corresponding in status to that of St. Andrews, constituted in 1472. The rivalry of the double primacy caused much unpleasantness, culminating in the episode of 1545, described with gusto by Knox, when in the Cathedral of Glasgow itself the crosses of Archbishop Dunbar and Cardinal Beaton of St. Andrews were broken in a scuffle for precedence.

The day of cathedral and archbishop as controlling ecclesiastical forces was still at noon. The cathedral establishment had now thirty-two canons. The archbishops were lords of the burgh of Glasgow; they chose the provost and bailies. They were perpetual chancellors of the University. Their domains were of princely dimensions. Their church courts had an immense and lucrative jurisdiction. The historian Lesley

in 1578, describing Glasgow, says "The landes rounde about the space of 4 or 5 myles pertaines to the Archibischope," but their possessions were far beyond that limit. The rental book still extant embraces, besides the burgh and the barony of Glasgow, the baronies of Carstairs and Stobo and Eddleston. In the city each trade or craft incorporated, from the Skinners and Weavers in 1516-18 to the Masons and Cordiners in 1551-59, had its own saint with a special altar in the Cathedral to maintain. Little can the chapter have foreseen, even in the middle of the sixteenth century, how quickly their great lease of power, secular no less than sacred, was to run out. But that strangely democratic movement the Reformation came, and the mightiest corporation of all was swept away in the storm. Happily the beautiful structure, unique in its almost complete preservation, has equally escaped the dangers of violence and of neglect. The western towers alone were "restored" out of existence. Joseph Robertson in 1849 and Macgregor Chalmers in 1914, both of them high students of mediæval architecture, have, with others, recorded their homage to the glories of the fane which rose through so many centuries over St. Mungo's shrine. The remarkable story of the rally of the crafts of Glasgow to the defence, when Reform counsels had persuaded the magistrates "to demolish the cathedral" in 1578, is discredited by the soundest local historians, and above all by Dr. Renwick, yet how circumstantial it is, recorded by a Protestant Archbishop of Glasgow who had been a student there in 1580.

In the development of civic spirit an indubitable factor had been the freedom of the city from domination by any of the greater baronage: for this the wide civil lordship of the bishops and archbishops themselves chiefly accounted. The general wisdom of the diocesan management equally tended to secure the community from external interference, and that security encouraged the growth of a communal faculty of government which was eager to seize the opportunity of asserting itself when the Reformation drove the Archbishop into exile. But the community profited little from the spoil of the fallen Church, which appears mainly to have gone to the University, the Earls of Lennox, and the Crown. Glasgow did not even become strictly a royal burgh until the charter of 1611 gave it that status, scarcely perfected until 1681, when the long coveted right to elect the magistracy was at last completely secured.

The last Roman Catholic Archbishop, James Beaton, found it necessary to withdraw to France, carrying with him the muniments of the see, part only of which returned. With the later auspices of the Cathedral under archbishops of the reformed faith there is not space to deal. The ties with episcopacy were severed by the Revolution in 1688. With this came to an end the official and spiritual hegemony which Glasgow had exercised over the West of Scotland for upwards of a thousand years. Few more attractive questions can be set to the historian than to ask him whether any tradition of that hegemony lives transmuted into the influence of Glasgow, social, municipal, religious, educational, and commercial on land and sea to-day!

MUNICIPAL HISTORY AND ACTIVITIES.

By Sir JOHN LINDSAY, J.P., D.L., Town Clerk of Glasgow.

WHILE the origin of the oldest burghs in Scotland is unknown, and their early history obscure, no uncertainty exists as to the foundation of the burgh of Glasgow. As David I. granted to Bishop John of St. Andrews the site of the burgh of that name, and to the abbey of Holyrood leave to establish the burgh of Canongate, and as William the Lion conferred on the convent of Arbroath liberty to form a burgh on its lands, so the latter monarch granted to Bishop Jocelyn of Glasgow, between 1175 and 1178, the right to have a burgh at Glasgow, with all the freedoms and customs which any royal burgh in Scotland possessed. In 1190 a further charter obtained by this "gracious and complaisant" bishop, granted to him and his successors a fair at Glasgow, to be held for eight full days in July every year; and for more than seven hundred years "Glasgow Fair" has been unfailingly observed annually, though the object of its continuance and the manner of its observance have varied with the changes in the social and economic life of the country.

The city, being provided with church and market, went on its modest way till the middle of the fifteenth century. Then came the next epoch-making event in its history—the issue on 7th January 1450-1 by Nicholas V. of his papal bull for the establishment of a university. Teaching at first was carried on in the lower church of the Cathedral, but the new institution grew and prospered, and a separate building—the Auld Pedagogy in the Rottenrow—was probably used for college purposes. Again, within a few years, another removal was made to the east side of the High Street, where the new Pedagogy was erected (see Fig. 3). In 1573 the Town Council rescued the College from ruin by endowing it with all the kirk livings which had been granted to the city by Queen Mary. Rebuilt in 1636, the College remained in High Street till 1870, when the University was removed to Gilmorehill.

Coeval with the institution of the College the educational wants of the city were supplied by the grammar school, the regulation of which was the special care of the chancellor of the Cathedral. In addition to the grammar school other schools, known as "the mural schools," existed in the city and adjacent district to which the Magistrates and Council of the burgh claimed for centuries an exclusive right to appoint teachers. Included among these mural schools, to which reference is frequently made in the Council records, were the "sang school" or "music school," and schools for teaching what was sometimes called "Scots" and sometimes "English."

During the first hundred years of its existence as a burgh, Glasgow had a favourable opportunity of increasing its influence. Its overlords the bishops usually held high office in the state, and were possessed of sufficient influence at court to secure the community against external encroachment or oppression, while the varying conditions of the country permitted the internal organisation to develop. During the period of

Roman Catholic control the powers of the ecclesiastical authorities steadily expanded, and the municipality was entirely under their sway. In the confusion which ensued on the Reformation, the magistrates attempted to assert their independence, but the temporalities of the see, including the hereditary right to the nomination of the magistrates, and the regality and justiciary of the city, were reserved and disposed of by the Crown. Bit by bit certain privileges of election were conceded to the Town Council, but the last traces of ecclesiastical domination were not swept away till the year 1690, when a charter was signed by William and Mary, granting to the Town Council full power, right, and liberty to elect their provost, bailies, and other councillors. The loyal and enthusiastic support given by Presbyterian Glasgow to



FIG. 3.—Glasgow College, with Blackfriars' Church, in 1669.

the Protestant Succession was thus rewarded with rights for which the citizens had striven for more than a century and a half.

So intimate in the early days were the relations of the Church with the city that had it really taken for its motto the inscription found in 1631, in conjunction with the arms of the city, on the Tron Kirk bell, "Lord let Glasgow flourish through the preaching of Thy word and praising Thy name," none could well have cavilled at the choice. Mr. MacGeorge, who made an exhaustive inquiry into the armorial insignia of Glasgow, says: "There can be no doubt that the emblems which now appear on the city shield were adopted from the seals of the bishops and archbishops of the see," but whether the inscription on the bell "was intended as a heraldic accompaniment to the arms, is by no means certain. It is possible it was meant only as one of those inscriptions so common on the bells of churches to indicate their use and

the objects for which they called the people together, and the great length of it seems to confirm this view"; and it would be equally objectionable to adopt the partially abridged version, "Let Glasgow flourish by the preaching of the Word," for this conveys a part only of the original idea. The motto, "Let Glasgow Flourish," is general in its terms, and to those who know will always suggest the omitted words. The arms of the city bear on the foundation by St. Kentigern, with certain details illustrative of incidents, real or imaginary, connected with the life of the saint. These consist of the bell the saint is believed to have brought from Rome; the twig or tree, emblematic of the frozen bough he kindled into flame; the bird he restored to life; and the salmon which brought the lost ring of the queen of Cadzow.

So long as Glasgow enjoyed its connection with the Cathedral and its ecclesiastical hierarchy, and all the advantages they conferred, it remained parochial in its interests. Such foreign trade as was open to towns on the seaboard or on navigable rivers was denied to it save to a trifling extent. The Clyde was a shallow stream which could be crossed on foot at low-water miles below the town, and the passage of anything else than boats was at all times obstructed at Dumbuck Ford and other shallows above Dumbarton. Ships of considerable size could always get up the river as far as Dumbarton. That burgh, in 1469, tried to prevent Glasgow from purchasing wine from a French ship in the Clyde, but the lords auditors of causes and complaints, to whom Glasgow appealed, decided that the bishop's burgh, in such a transaction, was acting within its rights, and Dumbarton was ordained to "desist and cease of sic wrangwise stoppin and impediment makin in tyme to cum." In 1590 an arrangement was come to between Glasgow and Dumbarton, whereby it was agreed that whenever ships or vessels arrived in the Clyde, or other waters or lochs in the west sea, with merchandise from foreign countries, Dumbarton should immediately intimate the fact to Glasgow, and the merchants of the two towns should thereupon buy the merchandise for the equal benefit of both. The actual extent of the city's shipping trade at this time is uncertain, but in April and May 1597 ten vessels are entered in the records as trading with Glasgow. Of these, six belonged to Glasgow, two to Pittenweem, one to Aberdeen, and one to Dundee. They could not come near Glasgow, so their cargoes must have been brought up the river in small boats. In 1609 there is reference in the Council records to a pier and port at Broomielaw, likewise orders are given against ballast being emptied there, and in the following year a proposal is made for "taking away of the sands stopping the schippis and barkis fra in cumming to the town." From that time till now the deepening and improving of the river has gone on, till to-day the harbour of Glasgow, with its vast docks and dozen miles of quays, is probably the most wonderful achievement of the kind.

The development of modern Glasgow began shortly after the Union of the Crowns. In 1611 James VI. made the city a royal burgh, and two years later added to it the lands of Rottenrow. It was not till the year 1800 that the next additions were made, the lands of Ramshorn,



Meadowflat, and part of the New Green being annexed. Then, in the nineteenth century, small independent burghs grew up around it. The area of the ancient royalty is contracted along its southern base, and as this was the favoured locality for trading and commercial pursuits, buildings spread over the borders on each side. On the east side Calton was formed into a burgh of barony in 1817, and seven years afterwards another burgh of barony, that of Anderston, came into existence on the west. In the case of another populous district on the north-west—embracing the lands of the old barony of Blythswood—formation into a separate burgh was avoided by an Act of Parliament passed in 1830, which annexed it to the city. The burghs of Calton and Anderston, and likewise the barony of Gorbals, had each their own magistrates and special Police Acts till the year 1846, when the whole of these districts were included within the city. In 1872 and 1878 several suburban districts were incorporated. In 1891 the burghs of Crosshill, Govanhill, Hillhead, Maryhill, and Pollokshields, East and West, and several other residential districts; in 1896 the lands of Bellahouston; in 1899 the lands of Blackhill; in 1905 the burgh of Kinning Park; in 1909 the lands of Mosspark and Henderston; and in 1912 the burghs of Govan, Partick, and Pollokshaws, and several suburban districts were all amalgamated with the city. The population (which at the Reformation was only 4300, at the Union was not more than 13,000, at the first official census in 1801 was 77,385) had increased in 1901 to 761,712, and is now estimated to be 1,114,656.

Naturally the first and most important duty of the municipal government was the maintenance of order and the prevention of crime. The early system, under which the citizens kept watch and ward by rotation, though well enough adapted to primitive times, was, towards the end of the eighteenth century, found not to be effective for the preservation of order, owing to the steadily increasing number of the inhabitants of the town. In 1779 a body of police was organised and placed under the charge of a salaried superintendent; but the Town Council had no authority to levy an assessment for maintenance of police, and on account of financial difficulties the former practice had to be resumed. In 1789, by which time the population probably exceeded 50,000, the Town Council promoted a bill in Parliament for the extension of the city boundaries, the establishment of a system of police, and the levying of assessment. The views of the citizens were not, however, sufficiently advanced to perceive the benefit of such a change, and their strenuous opposition secured the rejection of the scheme. A rearrangement of the old system was then tried, the city being divided into four districts, and all male citizens between eighteen and sixty whose rents were over £3 compelled to take guard duty by rotation, thirty-six being on patrol duty every night. Meanwhile the population was increasing at the rate of about 1000 per annum, and by the last year of the century it became obvious that more effective police supervision was necessary. In 1800 the Town Council obtained an Act of Parliament whereby a regular system of police was established, and provision made for paving, lighting, and

cleansing. The extended city was divided into twenty-four wards, each of which was to be represented by a commissioner, and the Act was to be administered by the magistrates, dean of guild, deacon convener, and the twenty-four commissioners. As thus established, the duration of the police system was limited to seven years; but at the expiry of that period an amending Act was passed providing for the maintenance of the police for other fourteen years, and the better paving, lighting, and cleansing of the streets. The commissioners then for the first time got control of the Fire Department, the expense of which was to be borne out of the rates. Other continuing Acts were passed in 1821, 1837, and 1843, and by the Municipal Extension Act of 1846 it was provided that the Town Council should in future elect a Police and Statute Labour Committee for managing that department. Under the Act of 1877 the Police Board, as constituted by the Act of 1846, ceased to exist, and the management of police affairs was vested in the Magistrates and Council, who were under the Act of 1890 to be designated police commissioners. The system continued until, by the Act of 1895, the municipal and police government of the city and the administration of the several municipal trusts were consolidated in the Corporation, which is now the sole authority responsible for the management of municipal affairs. The administration of the police is now carried on under the Police Acts of 1866 and 1919, and the authorised strength of the force is 2247 of all ranks.

The privilege granted by William the Lion about the year 1175 of holding markets, and of exacting dues and customs from those frequenting them, has been exercised without intermission to the present day, and now the markets and slaughter-houses, as the results of that long experience, are not only of the utmost efficiency but thoroughly commodious. A wharf with slaughtering accommodation and chill-rooms is maintained at Merklands, where Irish and foreign cattle, sheep and pigs are landed and dealt with. The city owns separate markets for cattle, fish, vegetables, dead meat, cheese, and old clothes, and the debt on them is £493,022. These markets, wharf, and slaughter-houses are extensively used by traders and others from all parts of Scotland for the purpose of obtaining supplies.

Gas as a luminant was first introduced into the city in 1818 by a company which had been formed in the previous year. Another company was formed in 1843, and these two companies continued until 1869, under their original and amending statutes, to supply the city and neighbourhood. In the previous year the desirability of having the lighting of the city and its suburbs vested in the Corporation induced that body to open negotiations with the two companies for the acquisition of their works, with the result that a bill was promoted to authorise the proposed transfer, and it received the royal assent on 24th June 1869. The Corporation now supply with gas an area of 98 square miles lying within the counties of Lanark, Renfrew, Dumbarton, and Stirling, and extending from Dunglass Castle on the west to Chryston on the east—a distance of $15\frac{3}{4}$ miles—and from Milngavie on the north to Burnside on the south—a distance of

11 $\frac{3}{4}$ miles. Chemical works for dealing with residual products adjoin each of the three gasworks, and by its method of working the Corporation realises more for its chemicals per ton of coal than any other large gas undertaking in the kingdom. Electricity for lighting and power purposes is supplied under the Glasgow Corporation Electric Lighting Order 1890 and subsequent Acts. The capital expended on the gas undertaking is now £5,000,000, and on electricity plant £1,429,400.

Originally Glasgow depended for its water supply upon streams like the Molendinar and St. Theneu's Burn, and upon wells such as those at the Bishop's Castle and Townhead, the Lady Well, the well at the Little Dhu Hill and Arn's Well on the Green. In the early years of the nineteenth century these were supplemented by William Harley, who brought a supply from his house of Willowbank, in the Sauchie Haugh, and distributed it by carts throughout the city. He was superseded by companies who pumped water from the Clyde at Cranstonhill and Dalmarnock, and sent it through the city in pipes, while the Gorbals Company brought a supply by gravitation in pipes from the Mearns lochs and distributed it on the south side of the river. The city, however, obtained powers in 1855 to bring a supply from Loch Katrine in Perthshire, and the water was turned on by Queen Victoria in 1859. Glasgow's example in this enterprise has since been followed by most of the great cities of the United Kingdom, whose aqueducts far more than rival those of ancient Rome. Still later the level of Loch Katrine has been raised to provide a greater supply, the waters of Loch Arklet have been added, and powers have been got to impound the waters of the River Turk in Glenfinlas, and to increase still further the supply from Loch Katrine. The city now receives over 79,000,000 gallons of water per day, and the cost of the undertaking has been over £4,847,000.

In early times, with open fields in every direction, the inhabitants had ample space in which to roam, and little value would be placed on the preservation of vacant ground. The Old Green between the Broomielaw and the mouth of the Molendinar was by degrees disposed of in building lots, and the New Green was for a long time mainly used for grazing purposes. About the year 1810 more attention was bestowed on the laying out of the New Green as ornamental and recreation ground, and in the course of time considerable improvements were effected. With the increase of population and the spread of new streets, the Green rose in estimation, but its benefits were not shared to any considerable extent by the residents in the west end of the city, including those occupying the district annexed in 1830. An opportunity occurred in 1851 for having this anomaly remedied. A few of the influential citizens submitted to the Town Council a proposal for acquiring the lands of Woodlands, Kelvingrove, and Gilmorehill, and forming a park thereon. To this scheme the Council undertook to contribute £10,000 in consideration of the park being handed over for the benefit and behoof of the public. On these terms the first portion of the Kelvingrove Park was acquired, and subsequently various

additions were made. After the West End people had been supplied, those on the South Side put forward a claim for similar privileges. To meet this reasonable desire the Town Council acquired the lands of Pathhead in 1857, and there formed the Queen's Park. An addition to this fine park was made in 1894, when the adjoining lands of Camphill were acquired and the whole grounds were laid out on a uniform plan. At first the Town Council had managed the parks without any special powers, but in 1859 an Act of Parliament was obtained whereby the lands acquired for such purposes were to be kept up on specified conditions and maintained out of the rates. Since then several other parks both within and outside the confines of the city have been acquired, some by purchase and the others by donation. Among them are Bellahouston Park on the south-west and Alexandra Park on the north-east, with Tollcross on the east and Cathkin Braes and The Linn on the far south of the city. Lochlomond Park, which is situated on the banks of the loch of that name and the river Leven, and the Ardgail estate at the junction of Loch Long and Loch Gail, are much frequented, particularly during the spring, summer, and autumn months, by the inhabitants of the Glasgow district for the purposes of holiday recreation—such as Sunday school treats, picnics, holiday camps, boating, and mountaineering. Provision has been made in most of the parks and recreation grounds for football, cricket, golf, tennis and bowling, whilst gymnasia and playing-grounds have been laid out and equipped for the use of the children. During the summer months musical entertainments are provided in the parks, and during the winter months musical performances are given in the Winter Garden on Glasgow Green and organ recitals in the Art Galleries.

The city's art collection was begun by the purchase in 1856 of the notable galleries of pictures brought together by Bailie M'Lellan, and for a generation the pictures remained in their original home in Sauchiehall Street. By the articles of association of the International Exhibition held in Glasgow in 1888, it was provided that any surplus should be transferred to the Town Council, to be applied in erecting and maintaining a gallery or museum of science and art, or otherwise in promoting art in the city. There was a surplus, and this, augmented by private subscription, was sufficient to enable the building of new Art Galleries in Kelvingrove Park to be partially proceeded with. The work was continued by the Town Council under the authority of an Act of Parliament, and the buildings, having been completed, now contain the various art, science, and industrial collections, which are the finest in the country out of London.

Towards the end of the eighteenth and the beginning of the nineteenth centuries tentative efforts were made to grapple with the evil of overcrowding of the population in slum areas. It was not, however, till 1866, when the inhabitants exceeded 400,000 and many districts of the city were in a very congested state, that the Town Council obtained parliamentary authority to remove several clusters of narrow closes and insanitary buildings, and to lay out the sites for widened streets and buildings on an improved plan. Under the Act

thirty new streets were formed and twenty-six were widened, 90 acres were cleared and rebuilt, model lodging-houses were erected, and other great improvements carried out. The working out of this improvement has had a most beneficial effect upon the health of the community, and has in many respects added to the amenity of the city. A further improvement was carried out under the powers contained in the Act of 1897 by the removal of other insanitary areas where the same conditions prevailed as in the original scheduled district.

At the present day the housing of the population is again the paramount problem, and the Corporation, like other authorities, has had to face a building scheme to provide something like 57,000 dwelling-houses for its citizens. This task, with the assistance of the Government, the Corporation has undertaken; and in these days of scarcity, both of labour and materials, plans have been approved and tenders accepted for 3846 houses at an estimated cost, inclusive of streets and sewers, of £4,159,336, and 354 houses of a temporary nature at an estimated cost, exclusive of streets and sewers, of £174,572; 264 houses are to be erected by "direct labour" with the co-operation of the Operative Building Guild, the Corporation supplying all the needful plant and material.

Street tramways were first introduced into the city under authority of an Act of Parliament passed in 1870. For many years the tramways were worked by lessees, but on the expiry of the lease in 1894 the Corporation took the whole concern under its own management. In 1898 an experiment in electric traction was successfully tried on the Springburn lines, and arrangements were then made, and shortly thereafter completed, for the supersession of horse haulage by the application of electric power through overhead wires to the tramways, the power being generated at Pinkston Power Station on the high-tension system, and distributed through six sub-stations. The cars are of the double-deck single-truck pattern, constructed to carry 62 passengers, and a very close service is given at fares which are the lowest in the kingdom. The total length of tramways now operated extends to 198 $\frac{1}{4}$ miles measured as single track. There are in all twelve tramway depots; and the workshops of the department, which cover an area of 27,683 square yards, are used for the making and repairing of the cars, etc. The storage yard, adjoining the workshops, covers an area of 18,432 square yards. During the past year the car mileage run was 26,459,015, the total number of passengers carried was 509,339,886, and the traffic revenue was £1,716,490, 16s. 8d.

As part of the sanitary administration of the city, the Corporation exercises a careful supervision not only of the health of the citizens, but of the food supply of the city. The adoption on 16th December 1895 of a systematic application of bacteriological methods in doubtful cases of infectious disease has greatly facilitated administrative action and materially lessened the risk of having persons erroneously isolated in the municipal hospitals or left in unrestricted freedom. The inspection and sampling of all milk, meat, fish, fruit, vegetables, etc., brought by road, rail, or sea into the city for human consumption is carried out

daily, and in all doubtful cases samples are sent to the Corporation chemist for analysis.

Six hospitals for infectious diseases have been provided, and another large hospital is being completed; yet the provision for the institutional treatment of such diseases, though ample, is not even now sufficient to meet every possible demand, and consequently the Corporation is giving earnest consideration to suggestions for the best means to adopt for increasing the accommodation. There are also two reception houses for the isolation of persons who have been in contact with infectious disease. The treatment of persons suffering from tuberculosis comes within the powers of the Corporation, and 842 beds in hospitals and 155 beds in sanatoria have been provided, while the cost of treatment of patients elsewhere has to be paid. An additional sanatorium is in the course of erection, and will shortly be completed. Thirteen separate centres for infants have been established, where consultations are regularly held. Five child-welfare centres or day-nurseries have been instituted; two country homes have been opened, and a third will be opened shortly, for the reception of young children suffering from malnutrition, etc.

The cleansing of the city and the removal and disposal of domestic and other refuse, as well as the sweeping and watering of the streets, is carried out by the Corporation. Portable dust-bins have now been substituted for the former ashpits, and are, within the central area, emptied daily, while those in the other districts of the city receive systematic attention. The refuse is treated at the various refuse destructor and despatch works by the separation of saleable from unsaleable material, —the former being disposed of to agriculturists and others, and the latter cremated; 422,000 tons of refuse are dealt with annually; and 1480 acres of land are owned, and 38 acres are leased for the purpose of providing an outlet for the unsaleable, though useful, portion of the city refuse. Much of this formerly useless land has now been reclaimed and transformed into a valuable agricultural subject, and that it is a successful branch of the work is shown by the combined profits on the farm cropping accounts for the past year, amounting to £9492. Since the start of the system no less a sum than £342,700 has been realised from the sale of the "refuse."

Until 1894 the Clyde was made the cesspool of the city, but in that year the first sewage purification works were opened at Dalmarnock, and shortly afterwards the works at Dalmuir and Shieldhall were completed. Now the sewage of the city and suburban districts is treated by chemical precipitation, the sludge being converted into manure, and the unsaleable refuse conveyed by sludge steamer beyond the three-mile limit and dropped into the sea, while the liquid, after being converted by chemical and filtering treatment into a colourless and innocuous fluid, is run into the river.

The Corporation has provided nineteen bathing establishments with facilities for hot, cold, and swimming baths, and at two of these Turkish baths are also provided. Other establishments are to be erected shortly. Laundries are attached to all the establishments, at which admirable

facilities are afforded to the public for washing and drying clothes. There are, in addition, three public wash-houses or laundries without bathing accommodation. An open-air swimming pond has been provided in one of the city parks, and is extensively used during the summer months.

Glasgow purchased its first steam fire-engine in 1876, and to-day has a completely equipped and thoroughly efficient fire-brigade system. The brigade consists of 195 officers and men, who are wholly devoted to the work of fire prevention and extinction. The city is divided for fire-protection purposes into ten districts with a fully equipped fire-station in each. These stations are connected with the street fire-alarms, the police-stations, and the telephone exchanges, so that the brigade can turn out in the average time for a day call of from 15 to 20 seconds, and for an over-night call of from 30 to 35 seconds. Each station is in direct telephonic communication with the central fire-station. The officers of the fire-brigade carry out a systematic inspection of all places of amusement. They undertake the inspection, under the local building regulations Acts, of the means of egress from all buildings exceeding 60 feet in height, and along with the Master of Works carry out a joint inspection under the factory and workshops Acts, and superintend any necessary alterations to give effect to their requirements in all cases where the means of exit are insufficient for the number of persons employed.

The lending and reference libraries of the city had their origin in a bequest of the late Mr. Stephen Mitchell for the establishment and endowment of a large public library in Glasgow. To-day, under the administration of the Corporation, the city is in this way thoroughly well equipped. The Mitchell Library is a reference library, containing about 250,000 volumes, and in extent, variety, and value takes rank with the chief reference libraries in the kingdom. There are twenty district lending libraries and reading-rooms established throughout the city, and four other district libraries are to be erected shortly. The Stirling's Library, which was recently taken over by the Corporation, contains, for reference, the publications issued by the Patents Office. The Commercial Library, which is located in the business centre of the city, contains a collection of information respecting all branches of trade and commerce, which is readily accessible to all persons engaged in commercial pursuits. Besides these there are other reference and lending libraries in the city.

Till 1891 the City Hall in Candleriggs, with accommodation for 3000 people, was the only considerable public hall belonging to the Corporation. In that year the public halls of several burghs annexed to the city were taken over. St. Andrew's Halls, in the west of the city, were next taken over from private owners, and others have been built in connection with the district libraries. Although the Corporation thus possessed twenty-two public halls suitable for the purposes of popular instruction, recreation, and amusement, in different parts of the city, yet till 1917 there was no hall large enough to provide floor-space for trade or other exhibitions. To meet this clamant need the Corpora-

tion erected a building at a cost of £47,000. This Kelvin Hall, which has an area of 200,000 square feet—a floor-space exceeding that of any other hall within the kingdom—was deemed to be more than ample to meet every expected demand, but already there are signs that it is proving to be inadequate, and the question of an extension is receiving consideration. Following upon arrangements made with the Board of Trade, a British Industries Fair was held, in conjunction with similar fairs in London and Birmingham, during August 1918. At its con-



FIG. 4.—The Trongate from the east, 1770, with the Tolbooth.

clusion the building was commandeered by the Government for war purposes as an army clothing depot, and possession was not regained till February 1919. Since then a British Industries Fair has been held annually, and each has successfully met the purpose for which the fairs have been instituted. During the periods when the hall is not so required, exhibitions of local industries are held for the purpose of furthering the interests of the trade of the city, and of educating the people in those industrial arts which are so essential a requirement to present-day civilisation. Carnivals are held at the two great holiday periods of the year which afford opportunities for the reasonable and

healthy enjoyment and entertainment of the working classes, of which they gladly avail themselves. All these enterprises are promoted and controlled by the Corporation, and have had the most gratifying result of meeting not only the initial cost of the building, but of showing a credit balance of £10,000.

As a worthy headquarters for all these institutions and activities the city has a noble pile of buildings in George Square. It is interesting to compare them with the old Tolbooth, at the foot of High Street (Fig. 4), and the northern part of the present County Buildings in Ingram Street, where the government of Glasgow was formerly carried on. The present buildings, with their stairways of marble and alabaster and their stately apartments of mahogany and satinwood, form one of the chief sights of the city. Their cost, with furnishing, was £551,378, and large extensions to them are now being made.

It is impossible, within the confines of this article, to give anything like an adequate account of the progress of the city, and of the full development of its municipal undertakings and enterprises; sufficient however has been cited from the facts of the past and the institutions and activities of the present to show something of the character, in bygone times and to-day, of the government of the city which now spreads for so many miles on both banks of the Clyde.

THE RISE OF TRADE AND INDUSTRY.

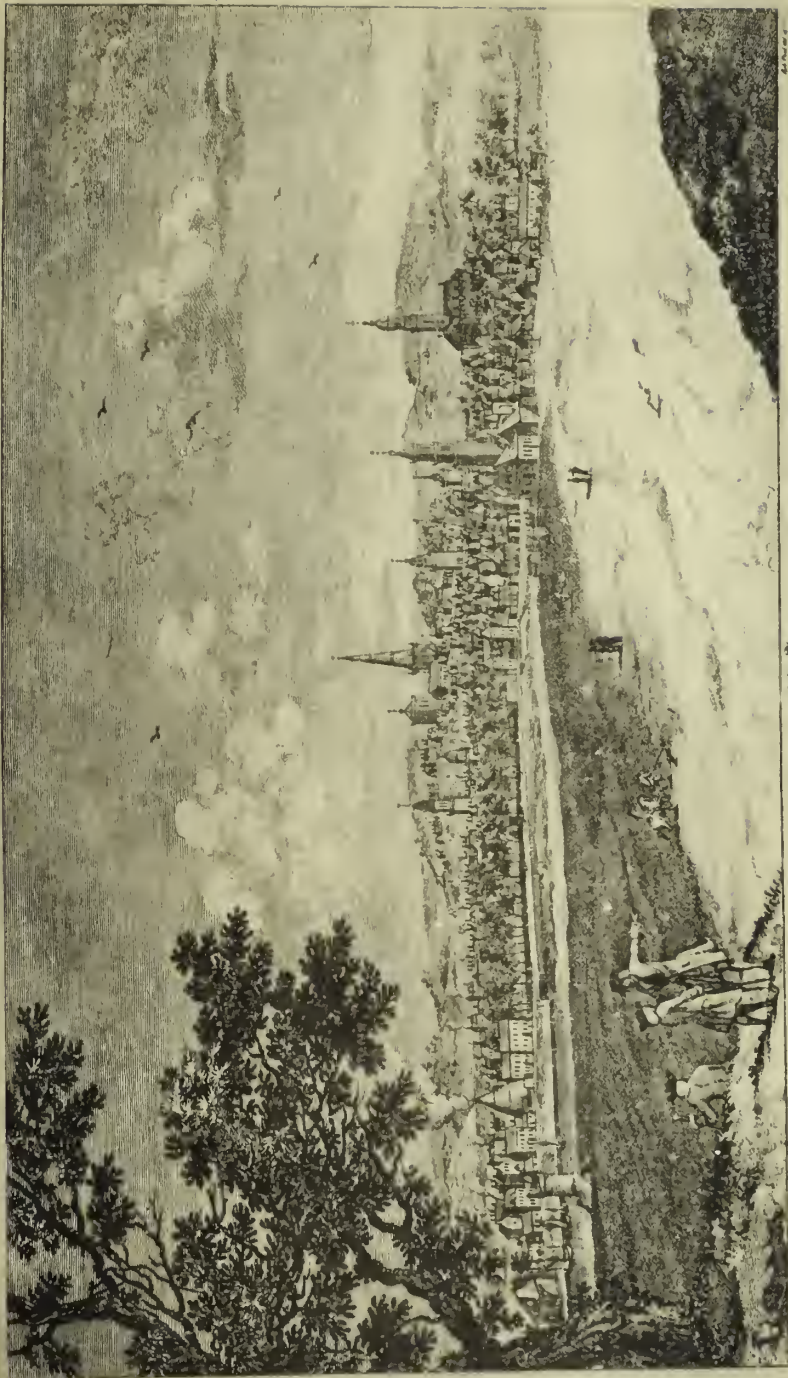
By WILLIAM POWER.

THE region in which Glasgow stands is one marked out by Nature for the site of a great city. It is flat or gently undulating; sheltered by mountains and forests on the north and north-west, and by moorland hills on the south; it enjoys a fertility of soil and an equability of climate that are remarkable in a position so far north-west; it is on the seaward edge of one of the richest coal-fields in Britain; with a plentiful mixture of ironstone; it is continuous with the central plain of Scotland, and, by a low pass, with the Ayrshire littoral, and has access by the upper Clyde valley to Tweedside, Annandale, and Carlisle, and by the Clyde itself to the West Highlands, the Irish Channel, and the Atlantic. Within such a region the most favourable point is that where the river is still easily fordable and navigation of a kind begins. This advantage was shared by three of the settlements that grew into towns—Rutherglen, Glasgow, and Renfrew (cf. Map 1). Dumbarton (Aldwyd), the ancient capital of Strathclyde, had a future as a naval stronghold and base, and as a shipbuilding centre, but its position some miles below the point at which the Clyde is bridgeable put it out of the running for civic greatness. Rutherglen was a shade too far up the Clyde; it was as an agricultural centre, with special burghal privileges, that it became in the Middle Ages the most important town in the south-west of Scotland. Renfrew, five miles below Glasgow, had an ideal position of

which, for a variety of reasons, it failed to take advantage. In any case, the matter had been predetermined in 543 A.D., when St. Kentigern, better known as St. Mungo, came from Culross and established a missionary station on the west bank of the Molendinar, about a mile from its confluence with the Clyde. For the see which he thus founded, and the cathedral which was erected in 1124 on the site of his cell, took their name from the British hamlet of Glasgow, beside which St. Kentigern had set up the Cross. Thus Glasgow was a city more than five centuries before it became known to authentic history, and nearly six centuries before it was erected into a burgh of barony. And the origin and progress of the city are set forth, with singular accuracy and appropriateness, in the patron-saintship of St. Mungo and in one form of the civic motto, "Let Glasgow flourish by the preaching of Thy Word."

To what extent the Word was preached during the centuries between the death of St. Kentigern and the restoration of the see under Bishop Achaius, the nominee of David, Prince of Cumbria—afterwards King David I. of Scotland—we have no certain knowledge. But the existence of a certain amount of trade may be presumed from the needs that led to the establishment by William the Lion of a weekly market and a yearly fair, and from the subsequent exemption of Glasgow from tolls levied by the royal burghs of Rutherglen and Dumbarton. Trade also was stimulated by the revenues in kind from the cathedral lands throughout the south of Scotland, by the extensive building operations in and around the cathedral from 1124 down to the end of the fifteenth century, by the founding in 1246 of a large monastery of Dominican or Black Friars, and by the residence in Glasgow of many prebends of the cathedral, and, later, of several of the West of Scotland nobility and gentry. All these causes are more than sufficient to account for a population of over 1500 at the time of the Wars of Independence, when the city became conspicuous through the battles fought in its streets and the part played by its Bishop, Wishart, in support of Robert the Bruce. A period of rather sleepy development followed, and the year 1450 finds Glasgow with a population exceeding 2000. In that year, "on account of the healthiness of the climate, the plenty of victuals and of everything necessary for the use of man," Pope Nicholas v. granted a bull founding Glasgow University, which within a year or two enrolled over 200 students. This was a highly important event in Glasgow's history, and it led to the elevation of the see into an archbishopric in 1488. In the period to the flight of Archbishop Beaton in 1560 the city reached the height of its floreaton under purely episcopal ægis, attaining in that year a population of 4500.

Glasgow had definitely declared for Protestantism, and the beginning of its modern era of independent development, civic and commercial, was marked by the help it gave to the Regent Moray's army at Langside in 1568. The Letter of Guildry, defining the privileges of the Merchants and the Crafts, was agreed upon in 1605, and four years later the line of "patron" provosts—aristocratic nominees of prelate or king—came to an end. But the beginnings of modern trade date from far back in the episcopal period. The guild of masons is certainly



(View of Glasgow from the South West)

coeval with the oldest stone of Glasgow Cathedral; eight out of the other eleven chief guilds received incorporation in Catholic times, and in each case association probably precedes incorporation by a century or more. Notably early incorporations are those of the skinnners and furriers, who dealt with the skins brought in from the wide pastoral and forest regions to the north-west; and of the weavers and hammermen (smiths), who were laying the foundation of Glasgow's staple industries. But it is in commerce and not in industry that the beginnings of her modern developments are to be found. The association of merchants (at first including the professions and even the smaller gentry) is, if anything, older than that of the trades, and the true direction of the city's activities was indicated as early as 1201 by a society of fishers, which was formed at the Clyde end of the road leading down from the Cathedral. Boats of a kind had plied on the river since Neolithic times, and by degrees the salmon catches of the "fishers" began to be supplemented by herring brought up the river by "shy traffickers" from the firth. Skins, sheep, and timber also arrived in this way; and in return were despatched cloth, simple ironware, and possibly even coals, which were worked on the northern outcrops of the Lanarkshire field from about the fourteenth century. Until the end of the fourteenth century Glasgow's traffic was purely inland and riverine. But in 1450 we detect a cadet of the house of Elphinstone in the act of shipping pickled salmon and herring to France in return for brandy and salt. Fifty years later, Archibald Lyon, a son of Lord Glamis, came to Glasgow and opened up traffic with France, Holland, and Poland; his ships may have been among the Glasgow-owned privateers that caused trouble to the English fleet in the early days of Henry VIII. Glasgow was already a shipowning centre, though nearly three centuries were to pass before she could bring her ocean-going fleet up to the Broomielaw.

Poland and Scotland were brought in touch through a crucial contrast in regard to trade. In Poland the nobility would not, and the peasantry could not, engage in commerce; the Jews were called in to supply the lack of a trading middle class, and the Scots followed close on their heels, competing with them as pedlars and shopkeepers as far inland as Cracow. The Scots who went to Poland as pedlars were the educated sons of small farmers, among whom to this day the tradition of the "Scotch drapery trade" persists. In their own country they made their headquarters in the small trading towns, forming the lower ranks and afterwards the main body of the merchant class. But the upper ranks of that class were recruited from the nobility and gentry, who alone had the capital and influence necessary for overseas enterprise, in days when the ship and her cargo were one property, and every sea-going vessel was an unofficial part of the navy. In the Glasgow Letter of Guildry of 1605 it is laid down that the Dean of Guild must be a "merchant-adventurer," or shipowner—in other words, a "gentleman." The persistence, even in aristocratic England, of this peculiar prestige of the foreign merchant is quaintly exemplified by the tuft-hunting Major Bagstock's deference to Mr. Dombey. Down to the

end of the eighteenth century the West of Scotland lairds were sending younger sons into Glasgow to make fortunes for their families. A historic example is that of the Walkinshaws, who gave three generations of merchants to the city, and got back into the "county" in time to give an officer to the Old Pretender and a mistress to Prince Charlie.

Between 1600 and 1660 Glasgow prospered amain, doubling its population in fifty years. At the Restoration it was the second city in Scotland. A custom-house had been set up in 1601, and in 1656 Commissioner Tucker made a report on the city to the Commonwealth Government. "With the exception of the colliginors (collegians)," he said, "all the inhabitants are traders: some to Ireland with small smiddy coals [mined within two miles of the city], in open boats, from four to ten tons, from whence they bring hoops, rongs, barrel staves, meal, oats, and butter; some to France, with plaidings, coals, and herings, from which the return is salt, pepper, raisins, and prunes; some to Norway with timber; and every one with their neighbours the Highlanders," who bring by boat "pladding, dry hides, goate, kid, and deere skins," with which they purchase "comodityes." The "mercantile genius of the people" was hampered by the fact that cargoes had to be unloaded fourteen miles down-stream and brought up in boats of not more than six tons. The troubles of the Covenanting period caused a severe set-back; the population decreased by 3000 during the "killing times." But the trading energy of the people was growing. Before 1650 they had attempted trade with Barbados, but had been hampered by English embargoes. A new endeavour was made to evade these. It took the form of the disastrous Darien Scheme (1696-1700), in which Glasgow lost heavily in ships, money, and lives. But the Darien disaster led indirectly to the Union, and the Union gave Glasgow the opportunity for the most romantic adventure in her commercial history.

Of the Clydesdale Covenanters who had been transported to the plantations of Virginia, Maryland, and Carolina in the decade before 1688, the most had succumbed to ill-treatment and the climate. But some had prospered and acquired interests in tobacco plantations, and thus a direct personal link was established between Glasgow and the richest part of North America. When trade was thrown open in 1707 the Glasgow merchants chartered ships for the plantation ports, and with the proceeds of the voyages they built ships for themselves. The trade grew and grew, until by 1770 Glasgow was importing, spinning, and re-exporting much more than half the tobacco used in all Europe. One firm alone had transactions in a single year of over half a million. The "tobacco lords," with their scarlet cloaks, dominated and rebuilt Glasgow, bought up half the countryside, and were in a fair way to demoralise the nation by their wealth, when the American War brought the trade to an end. A year or two of distress and difficulty was followed by a healthier expansion of foreign commerce. The sugar trade with the West Indies more than made up for the loss of the tobacco trade. The Clyde was deepened for ocean traffic; merchants began to turn their eyes to the "gorgeous East," and in the first years



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of the nineteenth century Messrs. James Finlay and Company despatched a vessel of their own from the Broomielaw with a cargo for India.

Commerce in Glasgow was the mother of industry. It was the difficulty of the eighteenth-century tobacco lords in making up outward cargoes that stimulated manufactures in the city, and the stimulus increased as the inward cargoes became less profitable of themselves. Glasgow had always been famous for plaids, and a "swatch" of them was presented to the Princess of Wales in 1715. But woollen manufactures were never practised on a conspicuous scale. Flax-spinning, introduced in 1725, was for fifty years the staple industry; in 1780 there were 3000 looms in the Barony Parish on linen fabrics. Ten years later cotton had superseded flax, and the weavers were mostly engaged on muslins. The power-loom, and with it the factory system, were introduced in 1773, and in 1792 steam power was employed in Springfield cotton works. It was the steam engine that made modern Glasgow, enabling it at last to exploit the enormous coal-fields of Lanarkshire and the cheap labour from perennially distressed Ireland. The population doubled between 1801 and 1821, and by 1840 Glasgow rivalled Manchester as a cotton-spinning and weaving centre. The decline of the cotton industry was due to the development of more profitable industries—chemical works, calico-printing, distilling, potteries, and so forth—but above all the iron trades. Ironfounding had been introduced into Scotland in 1680, but the native ironstone was not employed till 1760, when the Carron Company erected iron furnaces and foundries near Falkirk. By the time these were connected by canal with the Clyde, a waterway had been made from Glasgow to the Monkland region, a few miles away, where great furnaces were set up at the pit-heads. Iron foundries and engine works sprang up in Glasgow at the beginning of last century, and, with the application of Neilson's hot-blast to furnaces in 1829, the production went up by leaps and bounds. But the most notable venture of all was the construction of the engine of Henry Bell's *Comet* in 1811, with which began the era of steam navigation in Britain, and Glasgow's major industry of shipbuilding. Thanks to the energy of David and Robert Napier, the genius of Watt and the enterprise of Bell had their fruition in making Glasgow the shipbuilding metropolis of the world.

Of the development of that great industry through the periods of wood, iron, and steel; of its accompaniment by great shipping and ship-owning enterprises; of the expansion in all activities due to the growth of the railway system after 1831; and of the enormous work carried on around Glasgow in the way of steel construction, engineering, locomotive building—of these things it is not necessary to speak here, for they are treated elsewhere. What I have been concerned with is to indicate the gradual development of Glasgow from a cathedral town, "sleepy and slavish," into a busy commercial centre, and thence into a great metropolis of trade and industry. The natural factors in this development are apparent enough in the topography and geology of the Clyde valley. But the human factor is even more important. It was the courage, independence, and resourcefulness generated in the

Reformation and Covenanting periods that enabled Glasgow to recover almost at once from shocks like the Darien disaster and the American War of Independence, to overcome the natural obstacle of the Clyde shallows, to form an early partnership between science and industry, and, in the fulness of time, to take comprehensive advantage of her favourable geographical position. She has been, and remains, in every respect, the most versatile and virile of British cities. The severest test in all her history has yet to come—the gradual exhaustion of the Clyde coal-fields. How she will face it one cannot as yet even imagine. But it will not be in accordance with her traditions if she does not discover, and successfully apply, some effective substitute for the natural product on which for nearly two centuries her economic existence has seemed mainly to depend.

THE PORT AND ITS DEVELOPMENT.

By D. M. MACINTYRE, M.B.E., F.C.I.S.,

Assistant Secretary to the Trustees of the Clyde Navigation.

THE evolution of the great ports is of supreme interest to a Geographical Society. When such a subject is mooted we begin to think in continents; for ports are literally the doors of ingress from and egress to the uttermost parts of the earth. The great ports are formed to altruistic ends. Even those that are not conducted by Parliamentary Trusts are more of universal benefit than of private profit. Of public trusts the most important are the ports of London, Liverpool, Glasgow; of public companies, in the forefront is Manchester. By nature or necessity the position of a port is geographically selected. In the ultimate ends the ports embrace all geography, and relate themselves to all lands and peoples. Implicitly their motto is "I serve." In so far as that sentiment fails to find concrete expression they lose their universal usefulness and their own local soul. No service can be given by complacency. The "stand and wait" attitude is disastrous. In the evolution of a port apathy is atrophy; and development is rapid and orderly in so far only as it keeps pace with the times, and is directed by progressive men not afraid to be deemed heterodox. Given a suitable geographical position, populous environment, convenient industrial resources, and men of wisdom and daring to create and direct its affairs, the success of a port is assured and its purpose is served.

The essential conditions existed at Glasgow, albeit in embryo, and the result is seen to-day in the great port on the Clyde. In the development of the Clyde as a navigable river and of the port, there is, to the antiquarian and the patriot at least, an element of romance. At Manchester, for instance, all the pre-requisites were ready to hand for a port to come into being, and needed only the directing mind; for the making of a canal was less difficult than the deepening, widening, and straightening of a river such as the Clyde, begun, as it was, when

engineering skill was in its infancy. On the Clyde the factors were in their primitive state, and began, in degree, to evolve *pari passu*. The initial difficulties were, therefore, much greater, and were overcome intermittently only, as men of imagination and zeal came severally upon the scene.

In this connection it may be of interest to sketch briefly the early history of the efforts to foster trade to and from Glasgow. Direct trading by means of vessels does not seem to have found favour with our remote ancestors. The river was shallow and tortuous, with many flats, channels, and islands; and only a seer could prophesy that it would ever become navigable by the large vessels which the future was to bring forth. In the sixteenth century the port was Irvine on the Ayrshire coast, forty miles away, goods being brought to Glasgow by pack-horses. In the early part of the seventeenth century, however, the citizens began to arise out of their lethargy, and the flow of the little stream was often disturbed by voluntary workers who used various devices to scrape a passage for the keels of small craft. Charles the First, in recognition of those efforts, granted to the city, in 1636, a charter empowering the navigation to be improved from Glasgow to the Cloch, a distance of thirty miles, and dues therefor to be levied. Even for long thereafter the idea of making the river navigable to Glasgow had not dawned upon the pioneers. They tried to avoid the difficulty of dealing with the many fords by seeking to found the port to the west of Dumbuck Ford, fourteen miles from Glasgow. In 1658 the Town Council of Dumbarton was approached, with the view of forming the port there, but that historic town was afraid of the evil effects of the "influx of mariners," and lost its opportunity. Ten years later the Town Council of Glasgow bought thirteen acres of land at the village of Newark, four miles farther down on the opposite side, and there a harbour was formed, to be known as Port-Glasgow. At that time there was only "ane little key" at the Broomielaw—so small indeed as to warrant the vandalism of being repaired by timber from the "Hie Kirk or back gallerie." Port-Glasgow served its purpose for a time, and in 1762 boasted of a graving dock, the first in Scotland, constructed under the direction of the illustrious James Watt, and in 1812 became the birthplace of Henry Bell's *Comet*, and of steam navigation in Europe. The little quay at the Broomielaw was, however, the nucleus of the great port of Glasgow. There was not much progress in Scottish trade from the reign of Charles I., partly owing to political intrigue. By the Union with England in 1707, however, the colonies were opened up to commerce. Goods had still to be brought to Glasgow from the lower reaches in small craft; and a vessel of 60 tons was built on the Clyde which commenced the trade in tobacco for which Glasgow became famous. The advantages of trade were becoming apparent. Necessity was the mother of each little quay. James Watt was "still slumbering in the deep of time," and it was not until one hundred years later that there was any appreciable foreign trade with Glasgow direct. Except for tobacco and sugar, and possibly timber, the goods handled at the quays, in the beginning of the eighteenth century, were of local and

coasting origin. The dues payable at that time covered the use of the "Bridge, Key, and Cran," and seem to have been drawn at a venture. "Every boat of twelve tunns and upwards" had to pay 13s., but 6s. if belonging to a "freeman." Herring and ling boats paid 10s.—"the tacksman to have further two ling besides the dues of the boat." "Every potato-boat, two pecks of potatoes for the tacksman, and no other dues." "Every lump of butter 4 lib. *and above*, 8d." "Every boat full of coals of 12 tunns and upwards, 6s."

For the following thirty years trade made little progress. From 1755 onwards engineers were employed to advise upon the deepening of the navigation, which at some places had only fifteen inches of water. The first was John Smeaton, and it was not until after his report that the first Act of Parliament was obtained for a definite scheme of improvement from the Bridge to Dumbuck Ford. Thirteen years later John Golborne, of Chester, was consulted, and reported that even then the river was in a "state of nature," with not more than two feet of water at certain shoals. He recommended contraction by jetties and deepening by dredging. A year later James Watt confirmed that report as to the depth. The Town Council was impressed by Golborne's report, for in 1770 they got an Act to carry out his recommendations, instead of the method of locks or dams as advised by Smeaton. The same Act authorised the enlargement of the Broomielaw Quay and the construction of a quay on the South Side. Golborne, having been employed to carry out his ideas, constructed numerous jetties and walls, one of which, the Long Dyke, from Dunglass to Dumbarton, still stands, and with such success that in 1773 the depth at Dumbuck became, by natural scour, 7 feet, and vessels drawing 6 feet came up to the Broomielaw at high-water. He found, in 1781, that the depth at Dumbuck was 14 feet at low-water. In 1799, on the recommendation of John Rennie, walls were constructed to join up the ends of the jetties, the land thus reclaimed becoming the property of the frontager. Thomas Telford, also eminent in his profession, advised in 1806 the continuing of the system of parallel dykes adopted by Rennie. He states that in that year the *Harmony* of Liverpool, drawing 8½ feet, reached the Broomielaw. On his advice a towing-path was formed from Renfrew to Glasgow.

The Clyde was, one hundred years ago, still "a thing of beauty," but the commercial spirit of Glasgow decreed that it was not to be "a joy for ever." The navigation had now definitely begun to throw off the "state of nature" described by Golborne, and the merchants were beginning to see, as through a glass darkly, that the port and commerce were one and indivisible. We now comprehend that the earnest work of the citizens and their advisers has been of inestimable value not only to Glasgow but to the whole world. It can be said truly that, keen as a Glasgow shipowner or merchant may be, seldom has self-interest been put before the interests of the port.

The various early schemes for docks, in addition to riverside quays, are only of local antiquarian interest. An important stage in the history of the port was reached in 1809, when an Act was obtained to

define the powers and duties of the City Council as administrators of the Common Good and as Trustees. The Council were empowered to convey to themselves, as Trustees, the dues authorised to be levied, and also the quay and harbour itself, on payment of the advances which had been made out of the Common Good, and of a price, to be fixed by jury, for the Broomielaw Quay, which was then about 400 yards in length, and the adjoining ground. The total was £19,324. By the Act the Trustees took over the responsibility of maintaining and improving the harbour and river, were to keep separate accounts, and were authorised to borrow £30,000. By 1810 they had borrowed £3300, the nucleus of the seven millions since borrowed.

When in 1766 James Watt conceived the idea of the separate condenser, nearly fifty years were to unroll ere the *Comet* should come



FIG. 5. -The Broomielaw, Glasgow, in 1813.

into being. Although in 1802 a steamer plied on the Forth and Clyde Canal, and in 1807 another on the Hudson, 1812 may be taken as the date of the introduction of steam navigation as a commercial proposition. The great advance in the development of the steamship had an immediate influence on the evolution of the port; for by 1818 there were several trading and passenger steamers plying to places on the coast. Thus a fresh impetus was given to the Town Council as Trustees of the river, and in 1825 they obtained additional powers for deepening and other works. A feature of special significance in that Act was that five persons interested in the trade of the Clyde, nominated by the Council, were added to their number as Trustees. Later we shall see how that policy was developed, and how wisdom has been justified of her children.

Until 1818 it is recorded that no vessel in the foreign trade had come up to Glasgow. The only impediment to the development of

commerce was the shallowness of the river; and even in 1836, when James Walker, the Consulting Engineer of the Trust, reported that the depth at Glasgow was from 12 to 15 feet, trade was confined to vessels of from 300 to 400 tons. What was the principal factor in the development of the Clyde? Given the Trustees, the merchants, tutored zeal, the possibility of ships coming into being, the wealth of "Ormuz and of Ind" awaiting shipment, the ore mines of Spain and the coal-fields of Lanarkshire, the one factor wanting was an adequate waterway. The discoveries in steam gave assurance that a shallow stream would no longer be a barrier. The dredging of the river has been the matrix not only of shipbuilding on the Clyde but of the port itself. The keel of the *Aquitania* in its passage down the river in 1914 passed thirty feet below the place at Dumbuck where the harrow and plough used to trouble the bed. Not only had shoals to be deepened, but islands had to be removed, competitive channels dammed up, and bends straightened. Dredging was done by hand and horse power until 1824, when steam-driven dredgers of 12 H.P., built of wood and dredging to ten feet, were introduced, the material being removed by punts and deposited on the banks. Diving-bells were provided in 1852 and 1861 to remove boulders. In 1862 hopper-barges, similar to those then seen at St. Nazaire, were introduced, for conveying the soil to deep water. The Trustees have now four dredgers capable of cutting their own floatation and dredging to a depth of forty-eight feet, and had, before the War, a fleet of sixteen hopper-barges. The effect of steam dredging was seen in increasing trade, but vessels were all berthed at the riverside quays. Owing to the number of shipyards on the upper reaches, various schemes were formulated for docks in Tradeston and Anderston; and although Kingston Dock, on the lands of Windmillcroft, was authorised in 1840, it was not opened until 1867.

The providing of Kingston Dock marked an epoch. At that time the total tonnage of goods imported and exported was 1,600,000, one-sixth of the tonnage in 1913. In 1867 there was a considerable number of sailing ships in the foreign trade; and Kingston Dock, with its sheds of 35 feet wide, soon became the haven where the wooden barques trading to the West Indies and Rio shipped their sugar-plant and cast-iron pipes, and the more modern ships filled up for Sydney. The process took many weeks. The Blue-Peter was shown only when they were full, and their departure was a public event. There was a considerable trade in ice from Norway. Schooners also, with china-clay and limeshell, found refuge in the little dock. The wharfage, which was of timber, was reconstructed of concrete in 1917.

In the years intervening until the opening of Queen's Dock on the lands of Milton and Stobeross, accommodation and trade did not advance *pari passu*. The liners, it is true, had their allocated berths, the Anchor Line at Finnieston, the State Line at Mavisbank, the Allan and City Lines, and Messrs. P. Henderson's steamers, at Plantation, the sailing ships of the Loch Line at Springfield. The tramp coasters, however, had quite often to discharge or load second or third off, and had sometimes to await a crane berth two or three weeks. The opening of Queen's



ENGINEERS OFFICE
GLASGOW JULY, 1920
P.D. DONALD

Dock, and the completion of Stobcross Quay, on the site of shipyards and an old wharf, gave much relief. That the trade had developed faster than the accommodation is evidenced also by the fact that, with the exception of a small part of Plantation Quay, no berthage had been completed from 1867 to 1880, while the tonnage of vessels had increased by 2,000,000, and of goods by 1,000,000. Queen's Dock was not ready too soon. The Clan Line, which came into being about that time, the City Line, the Donaldson Line, and the Rangoon steamers occupied the whole pier, and Messrs. Hutchison's French steamers and other regular lines were berthed in the dock. Facilities were also given there for the loading of coal, which was previously done solely at the General Terminus by the Railway Company under an agreement of 1846, which is still in force.

The Trustees had, by their Act of 1858, become a reconstituted Statutory Body, and, besides ten councillors, two members were



FIG. 6.—Glasgow Harbour in 1839.

chosen by the Chamber of Commerce, Merchants' House, and Trades' House respectively, and nine were elected by the dues-payers. The Trustees were thus more than ever alive to the requirements of trade, and as early as 1870 began to purchase land at Cessnock in Govan, with a view to a large area being in their possession for a dock when such should become necessary. Indeed, certain lands were bought by individual members and transferred to the Trust at the original price. In 1883 a dock, to be known later as Prince's Dock, was authorised, and began to be used in 1890 by the Allan Line, and was completed, except for certain of the sheds, in 1897. While Queen's Dock (opened in 1880) gave 3334 lineal yards of quayage, Prince's Dock added 3737 yards. Its principal features are its piers and two-storey sheds.

In the ten years from the opening of Queen's Dock to the partial opening of Prince's Dock, the tonnage of vessels had advanced by 1,000,000, and of goods by 2,000,000, in converse proportion to the data mentioned for the period from 1867 to 1880. Prince's Dock was occupied as each quay was completed, and is to-day used by the

steamers of the Canadian Pacific Company, the Anchor-Donaldson Line, Furness-Withy, Maclay and McIntyre, and others. The South Quay is meantime set apart for the discharge of ore and the shipment of coal, but a goods shed is about to be erected.

The quaysage at Stobcross, abreast of Queen's Dock, being inadequate for the increasing size of the liners berthed there, the Trustees in 1910 completed deep-water berthage at Yorkhill, on the site of a slip-dock and the timber-discharging wharf; and the new berthage, 1137 yards in length, is taken up wholly by the transatlantic steamers of the Anchor Line and those of Messrs. Holt to China and Vancouver. The sheds are 100 feet wide, as are those at Meadowside, where, in addition to the grain trade, Messrs. Holt's Australian trade is carried on. At those new quays and at Merklands Quay, where cattle are landed at lairage belonging to the Corporation, the depth is nearly forty feet at high-water.

Those quays described are the latest, but by no means the last, as will be seen. The ever-increasing size of steamers had set the pace for deeper quays and wider sheds. A pier which could accommodate three steamers on one side, when Prince's Dock was constructed, is now no more than sufficient for two; and a cargo discharged quickly, even into both storeys and on to the roadway, often overflows into the adjoining berth. The sheds of the future will certainly be designed to enable a cargo to be dealt with in the ship's length.

As three-fourths of the goods traffic of the port are carted for local distribution or to railway goods stations, the Trustees seek to provide for such traffic as near as possible to the city, and to concentrate rail traffic and goods for storage at the lower parts of the harbour. They are trying to pursue, as far as practicable, the policy of allocating and equipping quaysage primarily for specific trades; and they find that this is conducive to economy and despatch. The overseas timber trade, for instance, was dealt with at Yorkhill, in the days when sailing ships brought whole cargoes, and storage was given on ground adjoining. The purchase in 1884 of 80 acres of land at Shieldhall—the nucleus of what has since become nearly 450 acres—provided suitable storage, and there the bulk of the timber is discharged and stored. Part cargoes of timber are still allowed, for the convenience of liners, at ordinary shed berths, and for such there is storage behind Prince's Dock. The timber trade has increased since 1880 from 76,000 to almost 350,000 tons a year, and the total storage area, with sheds for fine wood goods, is now nearly 60 acres. Shipment of coal, which, apart from the General Terminus, was done at Queen's Dock, has for the past thirteen years been carried on at Rothesay Dock also. The total tonnage of coal shipped in 1880, when Queen's Dock was opened, was 455,000, and before the War reached over 4,000,000. An endeavour is being made to confine shipment of coal, other than for bunkers, to Rothesay Dock. The trade in foreign ore is being dealt with similarly. That traffic increased so rapidly that, in 1882 and 1893, goods sheds at Springfield and Mavisbank had to be removed to provide cranes and tramway facilities; and this led the Trustees, in pursuance of the

policy mentioned, to form Rothesay Dock, where special berthage and modern appliances could be provided, and the berthage near the city conserved for goods traffic. This dock, opened in 1907, has a mile of quayage, and is fully equipped with coaling hoists and ore-discharging cranes all operated electrically. The ore traffic, which forty years ago amounted to 65,000 tons, reached in 1917 to almost 1,250,000 tons. With the object, similarly, of relieving the sheds of bulk grain, the Trustees, in 1904, obtained powers to provide stores and act as storekeepers; and in 1914 they opened Meadowside Granary, which is capable of storing 31,000 tons on floors and in silos, and is equipped with the most modern appliances, electrically driven, for the discharge, handling, and delivery of grain and flour. Of the whole imports of grain and flour (700,000 tons) last year the total quantity passing through the Granary was 202,740 tons, equal to seven times its storage capacity, and this will be increased by the additional discharging plant about to be installed. The Trustees have thus again justified their policy of concentration and special facilities in the interests of economy and for the fostering of trade. The bulk-oil trade was commenced with the construction by the Admiralty of a wharf near Bowling, and, also under an agreement with the Trustees, a public company have begun operations there at their own wharves. Other companies contemplate installations in the same vicinity. Facilities are given for shipping oil fuel at these wharves, and vessels may also receive bunker oil from oilers at their ordinary berths. Previously the imports of oil were only about 30,000 tons a year; whereas the quantity discharged at the Admiralty wharf since its opening two years ago was 550,000 tons.

In addition to assigned berthage for special trades, such as those of coal, ore, timber, and grain, there is the system of allocated berths, including two miles for coasters, for most of the regular steamers. This has not only contributed to rapid despatch, but is also a great convenience to consignees and shippers.

The Clyde being a centre for ship-building and ship-repairing, the Trustees have to provide for new vessels fitting out, and as those vessels, which often number over seventy at a time, require to be berthed where they can make use of the large machinery-cranes provided for them, they are accommodated at ordinary berthage. Certain of the shipbuilders have private fitting-out basins. The Trustees' graving docks, of which there are three, one of them 880 feet long, are in the centre of all this activity, and are equipped with pneumatic and electric repairing-plant. There are two docks in the vicinity privately owned, besides repairing-slips. For the repair of their own vessels and appliances, the Trustees have workshops at Renfrew equipped with the most modern electrical appliances, and having two repairing-slips.

The deep-water quays and all the facilities referred to would, however, be of little avail if the channel of the river had been neglected. We have seen that Golborne's work resulted in a depth of 14 feet at Dumbuck, and that the parallel-dyke system advised by Rennie and Telford had been effective, but nature unaided was too slow, and the

harrow and plough and other systems of hand-dredging gave place to the steam-dredger. Nature, however, was not only slow but recalcitrant; for rock was found which it seemed only a special mood of nature could remove. That was in 1854, before the advent of the barge-loading dredger. The rock was found at Elderslie, five miles from the city, by a steamer, the *Glasgow*, drawing 19 feet, grounding upon it. The obstruction occupied 925 feet in length of the river-bed, and its surface was 8 feet below low-water. The methods adopted were blasting and rock-breaking and removal of debris by dredging, with the result ultimately that in 1907 the rock was reduced to 28 feet below low-water. The bed of the river as a whole, which was, in its early state, a series of heights and hollows, has been gradually smoothed into the semblance of a bed, and lowered, throughout the whole jurisdiction of eighteen miles to Port-Glasgow, to the extent of 30 feet at the upper end, and of 26 feet at the lower, below low-water. The depth of the channel is 25 feet at low-water and 35 feet at high-water, so that, while the smaller vessels can navigate at any state of the tide, vessels which, not so long ago, took two tides in their passage, can now leave Glasgow about two hours before high-water, drawing 30 feet, and reach Greenock in one tide either by night or day, the river being provided with lighthouses and gas-buoys of the most modern kind. Widening of the channel has been effected from time to time, often involving the purchase of land much enhanced in value by the Trustees' own operations. It is this great work which, more than any quay facilities, has made the port what it is to-day, and has besides made it possible for shipbuilding yards to spring into being, capable of producing and launching huge liners and warships such as the *Aquitania* and the *Hood*. The reflex influence on trade has been most marked. Small vessels, which were legion forty years ago, bringing cargoes of a few hundred tons, are now but a memory. Steamers for Australia now leave with 12,000 tons under hatches, and only the other day a steamer arrived with 10,000 tons of wheat.

For the safe conduct of vessels to and from the sea, the Clyde Pilotage Authority have an efficient staff of pilots, and its affairs are administered on the most modern lines.

It is apparent that all the elements of progress have to operate concurrently if the full benefit of each is to be obtained. Mention has been made of the provision for specific large classes of cargoes, but it is the class of general overseas goods that gives the most trouble. For goods requiring cover there is on the quays a total shed-floor length of eight miles, varying from 55 feet to 100 feet in width. In those sheds there are handled about 700 different classes of goods, the chief of which are grain and flour, provisions, iron and steel, and wood goods. The cargoes are discharged by the shipowners and licensed stevedores, and are delivered to consignees by the shipowners and others as master-porters. Cranes are provided where necessary. In order to avoid congestion, the Trustees allow only a specified number of days for removal of goods, according to the size of the cargo, and thereafter impose quay-rent by way of inducing acceleration. Goods for ship-

ment are allowed to be laid down even before the vessel to load them arrives. For goods requiring to be loaded direct into railway wagons, there are at places, besides the mineral berths, tramway facilities connecting with the railways, the Trustees having for all purposes laid no less a length than 55 miles of single line. There are 130 cranes and hoists, steam, hydraulic, and electric, ranging up to a lifting capacity of 130 tons, and auxiliary appliances for moving wagons and weighing goods and minerals. For goods requiring to be conveyed across the river there are at the harbour three vehicular ferryboats and a tunnel, for which no charge is made, the cost being borne by the Corporation of Glasgow, who have made a provisional agreement to provide an opening bridge across the harbour at Finnieston.

The expenditure by the Trustees for capital purposes, since they became a separate body in 1809, exceeds £10,000,000, about 75 per cent. of which has been for land, quayage, dredging-plant, and dredging. The amount borrowed from the public, however, is under £7,000,000, of which £2,000,000 is irredeemable funded debt. The balance has been provided chiefly by surplus revenues, including the sinking fund. The available borrowing powers for works authorised amount to £3,000,000.

The revenue is derived from the dues levied under the statutory powers on vessels and goods and for services. The rates are as low as can be made consistently with the obtaining of revenue for the efficient administration and maintenance of the undertaking, and the providing of an adequate surplus to meet the sinking fund and give confidence to the public who lend their money. In 1770, when Golborne initiated the river improvement, the revenue was £147; in 1800 it was £3319; in the forty years to 1840 it had risen to £46,500; in 1880 it was £223,700; and in 1920 £1,077,998, having doubled since 1906. Of last year's revenue 65 per cent. was derived from dues on vessels and goods, and the remainder from cranaage and other services. Of the revenue expenditure 55 per cent. was applied in ordinary maintenance, taxes, and management, and nearly 28 per cent. as interest on borrowed money.

In 1800, when the revenue was, as stated, £3319, the quayage at the Broomielaw was 382 yards in length. In 1880 it was $4\frac{1}{4}$ miles, and is now fully 11 miles, having doubled in the twenty-five years before the War. While the revenue in the last forty years has increased by 382 per cent., the length of quayage in the same period increased by 158 per cent., but it is, of course, of a character much superior to the quayage built prior to 1880; for, while the earlier quays were of timber and stone with sheet piling, the later quays are almost all built on concrete cylinders sunk, owing to the nature of the strata, sixty and seventy feet below cope level, and only in a few places are they on rock or boulder clay.

With regard, similarly, to the development of trade in the past forty years, the net register tonnage of vessels using the port has risen from $5\frac{3}{4}$ millions in 1880 to 13 millions, an increase of 126 per cent., and the tonnage of goods from 2,600,000 to 10 millions, an increase of

28½ per cent. Of the total pre-War imports, ore, produce, and timber formed 70 per cent. Of the total exports, coal, iron and steel, and machinery formed 75 per cent. Of the gross total tonnage of goods, exports formed 60 per cent., while the foreign trade tonnage was 70 per cent. of the whole. Of overseas vessels last year the greatest tonnage was, in the order named, to and from North America, India, Spain, Africa, South America, France and Belgium, China and Japan. Of foreign imports last year (excluding ore) the greatest tonnage was, in the order named, of grain and flour, which was equal to 28 per cent. of the whole, oil, iron and steel, provisions, and timber; of foreign exports (excluding coal) iron and steel and machinery formed 47 per cent.

During the War the Trustees were fully engaged in the urgent task of providing accommodation for vessels loading munitions, and for the additional overseas vessels which were diverted to the port; and the difficulties were increased when the convoy system began, bringing a fleet of vessels at a time. There were also warships of every description to be accommodated while fitting out, and frequent visits of merchant cruisers for repair and revictualling. The graving docks were always full. The speeding up of iron-ore discharge was vital, and better despatch therewith was given than at any other port in the kingdom. The ordinary work of maintenance of the harbour had to lie in abeyance. Much of this work is now being carried out. The hydraulic power-plants at Prince's Dock and the graving docks are being renewed, and are to be wrought by electric current from the city. The hydraulic appliances at Queen's Dock are being superseded by electric. Contracts are at present in progress for the extension of electric lighting throughout the harbour. To accelerate the discharge of grain at the Granary berths pneumatic suction plant is about to be procured as an auxiliary to the two bucket elevators; and the provision of improved appliances for the more rapid discharge of ore is at present under consideration. Besides repair and renewal of appliances, certain quays required reconstruction. Plantation and Mavisbank Quays for a length of 900 yards are being rebuilt on a new line to provide more land space for wider sheds.

In furtherance of the principle, introduced in 1825, of having on the Trust members with local knowledge and conversant with the requirements of shipping and trade, the constitution was, in 1905, again altered to admit of a greater representation of traders, and of including persons chosen by the county councils and small burghs bordering on the Clyde. The number of members, which from 1858 was 25, was increased to 42, the members elected by the dues-payers being raised from 9 to 18. This policy has been fully justified, as there are included in the members men of technical skill, not only in trade and shipping but in constructional work and mechanical engineering.

The present Trustees, despite the great achievements described, are not resting content; for they are concentrating upon the arrangements to be made for development of traffic in the immediate future. The evolution of the port is entering upon a new cycle. The parliamentary powers which were obtained in 1911 and 1914 for the docks at Shield-

hall and the contiguous lands of about 450 acres, with two miles of continuous river frontage, westwards to Renfrew, have had to lie dormant during the War. The works, as provisionally designed, embrace seven basins set in echelon relatively to the river, and a graving dock, all capable of accommodating the largest classes of vessels likely to frequent the port. The new docks, which will shortly be commenced, will be provided with wide sheds and roadways and complete railway facilities, and will be equipped with the most up-to-date appliances for the rapid discharge, loading, and delivery of goods. The berthage will be allocated, in part, to the great liners, and the depth of water will be suitable for such vessels. The carrying out of the whole scheme will occupy many years, and will cost several millions of money, and when completed there will be five and a half additional miles of quayage. Provision will also probably be made for storage of special cargoes, such as grain and timber, and the shipment of bunker coal.

In whatever manner the port may evolve, the public may rest assured that the present duties will be performed by the Trustees with all the zeal and ability which have characterised their predecessors.

GEOGRAPHY AT THE UNIVERSITY OF GLASGOW.

By Principal Sir DONALD MACALISTER, K.C.B., M.A., M.D.,
D.C.L., LL.D., D.Sc.

FROM Bologna the University of Glasgow inherited the division of its "supports" or students into "nations," according to the region or country of their birth. The Natio Clydesdalia (now Glottiana) included Lanarkshire; the Natio Rothseiana Bute, Renfrew, and Ayr; the Natio Albania (Transforthana) the remainder of Scotland north of the Forth; the Natio Theridalia (now Loudoniana) the Lothians, Border counties, and Galloway—and all the rest of the world! Loudoniana is thus cosmopolitan and world-wide. In 1919 it included some 200 students from outside the United Kingdom. They come from Africa (South, Central, West, and Morocco), America (South, Central, United States, and Canada), Australia and New Zealand, India with Ceylon and Burma, Egypt, the West Indies and other Crown Colonies, France, Italy, Spain, Portugal, Serbia, Rumania, Greece, Norway, Denmark, Poland, Russia, China, Japan, Korea, Mongolia, and the Philippines. The candidate who wins the support at the triennial election of a majority of the Nations becomes Lord Rector of the University and titular President of the University Court. In 1914 the then purely Scottish Nations united with Loudoniana in electing to that high office Raymond Poincaré, President of the French Republic.

The students of the University have thus international interests and an international outlook. Its schools of medicine, engineering and naval architecture, have a world-wide fame. The city has been for generations a centre of world-wide trade. Glasgow has sent forth

many who, as explorers, engineers, geologists, biologists, physicists, missionaries, and pioneers of commerce and of civilisation, have advanced geographical knowledge and shed light in geographical problems. But it was not until 1909 that the University Court made specific provision for teaching the methods and principles of Geography as a subject of higher education. A Chair of Geology, as a distinct province of "Natural History," was founded in 1903, and the first professor, Dr. J. W. Gregory, is himself a distinguished geographer. The physical basis of Geography was inevitably included in his courses of instruction. But both he and the Principal, who at Cambridge had been instrumental in founding the University School of Geography, were agreed that Glasgow University's arrangements were incomplete without a properly equipped Geographical Department. The subject had its historical, economic, ethnographical, and mathematical aspects, as well as its physical substructure; it was related to more than one Faculty; and the study should have its place in more than one department, and in more than one curriculum for degrees. The Scotch Education Department and the Provincial Committee for the Training of Teachers, moreover, in view of the demand for improved methods of geographical teaching in the primary and secondary schools of the country, were desirous of providing a fuller and more scientific course of Geography for school teachers, and of co-operating with the University to this end. The University Court, moved by these considerations, took two steps of importance. First, it joined with the Provincial Committee in appointing, as head of the new department, Dr. H. G. Lyons, F.R.S., who had just retired from the post of Director-General of the Egyptian Survey, entrusting to him the double task of organising a course or courses of University standard, and a course for school teachers not students of the University. Secondly, it sanctioned the addition of "Geography" to the list of subjects qualifying for graduation in Arts, and presently promoted an ordinance authorising the like addition to the prescribed subjects for the honours degree of B.Sc. in Pure Science.

Later on it arranged that advanced study and research in Geography should constitute, for research students and graduates, an avenue to the doctorate in Science (D.Sc.) and in Philosophy (Ph.D.).

Accommodation and equipment, of a simple but for the time sufficient kind, were provided, with the ready co-operation of the Professor of Geology. For two years Dr. Lyons carried out the onerous labour of shaping and organising the twofold scheme of geographical education. To encourage the schools, Geography was admitted as an alternative Science subject in the Bursary Competition for candidates in Arts or Science. Ordinary and Advanced or Honours courses were instituted as the students multiplied, and the lecturer was made an examiner for degrees. In 1911, Dr. Lyons, who in that year received the Victoria Research Medal of the Royal Geographical Society, was called to important duties in London in connection with the Society. During the War he served as Commandant of the Army Meteorological Services, was promoted to the rank of Colonel, and is now Keeper of the Science Museum at South Kensington. On leaving Glasgow,

his duties in the rapidly growing school were transferred to Dr. J. D. Falconer, a graduate of Glasgow and Edinburgh, who had won distinction as principal officer of the Mineral Survey of Northern Nigeria. Under him the numbers enrolled in the teachers' classes rapidly increased, until a point was reached at which, even with the help of assistant lecturers, it was impracticable to carry on the geographical department under the original joint arrangement. But the lines of work had by this time been wisely drawn, and the foundations soundly laid. It was easy to arrange for their separate development. The University department thereupon assumed the responsibility for graduate and post-graduate study, and the Provincial Committee appointed its own staff for the training of teachers in Geography regarded as a school subject. Then came the War; and Dr. Falconer's intimate knowledge of Nigeria became of special value to the Government. He was twice called away for administrative duty in West Africa; and he is at present acting as Assistant District Officer in Northern Nigeria. During his absences the work of the department was carried on with the friendly help of Dr. Marion I. Newbigin, Mr. James Cossar, and others acting under temporary appointments. In 1919 Mr. Alexander Stevens, M.A., B.Sc., who was assistant in the department before he proceeded with Sir Ernest Shackleton to the Antarctic in 1914, and thereafter served with the forces abroad, was appointed Interim Lecturer during Dr. Falconer's leave, and is now in charge.

That the course of instruction is comprehensive and thorough, and that Geography is at Glasgow no "soft option" for the undergraduate, will appear from the following syllabus, extracted from the current *University Calendar*:—

"Ordinary Class.—This class qualifies for graduation in Arts. Students who propose to offer Geography, either as subsidiary or as principal subject in the Final Science Examination, are also required to attend this class. The lectures will be devoted to the regional study of the Continents, Countries, and Peoples of the World, and to the establishment of definite Principles of Geography. Practical instruction will be given in elementary surveying; delineation of topographical features; map-drawing to scale; copying, reducing, enlarging, and measuring maps; interpretation of Ordnance Survey maps; construction and use of meteorological charts, distribution maps, etc.

"Advanced Class.—This is the qualifying class for graduation in Science when Geography is taken as principal or subsidiary subject. The work of the class will be divided into two parts. Part I. will include a special course of commercial geography, an advanced course in regional geography, and exhaustive study of a special continent or region, with accompanying laboratory work.

"In Part II. the work will be of a more specialised character, and will be divided up into various courses of study. The courses at present organised are (a) Trigonometrical Surveying and Cartography; (b) Hydrography and Climatology; (c) Topographical and Structural Geo-

graphy; (*d*) Anthro-po-Geography. Only students who have taken Mathematics in their first B.Sc., or who are otherwise able to satisfy the lecturer of their knowledge of Mathematics, will be allowed to take course (*a*), while a similar knowledge of Physics, Geology, and Biology will be required of those taking courses (*b*), (*c*), and (*d*) respectively. Special papers and monographs will be prescribed for reading in connection with each course."

By 1913 the Glasgow School of Geography had already proved both its quality and its public usefulness, and efforts were in progress to place it on a footing commensurate with its importance as a branch of liberal education, by procuring for it a suitable endowment. In that year the city and University celebrated the centenary of David Livingstone, a Glasgow man and a Glasgow graduate. The proposal was made and cordially adopted, that among the local memorials to be established in his honour, as missionary, explorer, physician, and pioneer of empire, a Livingstone Chair of Geography in the University should be included. Perhaps because the effort was dispersed among a multiplicity of objects, the response to the appeal for a Livingstone Chair was meagre. The Court received and invested a sum of £400, as the "nucleus of a permanent endowment." It still holds that investment. The War and the Peace have diverted men's minds to other needs and other memorials. But the time must surely come soon when the special significance to Glasgow of geographical knowledge and research, and the reverence Glasgow owes to Livingstone's example and achievement, will impress its enlightened commercial leaders with fresh force. In that faith the University cherishes the "nucleus" of the Livingstone foundation for geographical study, convinced that Glasgow will not willingly let it die undeveloped. Since 1907 no less than fourteen new Chairs have been established in the University by private munificence; and most of them by their titles perpetuate to future generations the names of our benefactors. It would be supremely fitting if the University, which sought to honour Livingstone in his lifetime, should be enabled, by associating his name with the Chair of Geography, to set up an enduring and ever-fruitful monument to his great memory.

OVERSEAS RELATIONS.

By A. STEVENS, M.A., B.Sc.,

Lecturer in Geography in the University of Glasgow.

ALTHOUGH in origin an ecclesiastical city, Glasgow appears to have had commercial ambitions from the earliest times. Its monkish founders and early guardians took pains to promote the interests of its trade. It is not possible to separate the commercial history of the city from that of Clydesdale as a whole. In a sense it is true that the Clyde made Glasgow, but it is equally true that Glasgow made the Clyde. If

we are interested in finding simple and definite causes for the establishment of centres of population we shall find Clydesdale a region of sufficient extent and economic resources; but we must note that the city stands below the centre of the coal and iron districts, and well above the natural limit of navigation, and that it can hardly be called a "nodal" point at which a settlement existed from the earliest times: population was earlier grouped at other places in the neighbourhood, and the first settlement here was more or less artificial and ecclesiastical.

The incipient centre of commerce suffered from two disadvantages. Its river was useless even for primitive navigation, and its outlook was westward, away from the immediate direction of trade. For the early commerce the use of out-ports was necessary (cf. p. 43). But early trade was largely carried on with the Baltic and Channel ports, and we find that Glasgow obtained iron and dyes at first from Stirling and Bo'ness. The main landmarks in the history of the trade of Glasgow are the opening and temporary closing of western markets. The opening of the English colonies to Scots merchants at the Union of 1707 turned one of the early disadvantages into an advantage; the revolt of the colonies of North America caused Glasgow to turn inward and take stock of her capabilities, develop her resources and industries, and become a manufacturing centre. This reacted on her commerce, and caused it to alter in nature and increase many hundredfold in amount.

It is curious to observe how scanty are the records of the achievements of Glasgow men in exploration and the opening up of new markets. Scotland as a whole took little direct share in the great voyages of discovery which began in the sixteenth century. As an individual the Scot was already ubiquitous, but his achievements have largely gone unrecorded, and it is only, as it were, by accident that we learn that John Cunningham held commands in the Danish service in two voyages in search of the lost colonies of Danes in Greenland. In three large projects Glasgow had a share. The first was an attempt on the Greenland whale-fishing, made in connection with the soap works established in the city in 1667 by a company of "nine persons of distinction." The nine contributed the surprising amount of £15,000 sterling each (£135,000 in all), and had the *Lyone*, 40 guns and 700 tons, built at Belfast, together with the *George*, and either two or three other vessels which they fitted out for the fishery. The project was disastrous; ships and gear were lost, and a very promising venture nipped in the bud. The next was the Darien Scheme, to which the Corporation of Glasgow contributed £3000, and possibly £1000 more, while all the merchants probably invested heavily. In 1695 the city had risen from eleventh to second place in the list of Scottish burghs, and was consequently able to make a very large contribution. The last convoy left Rothesay in 1699, and the disaster occurred shortly after. The blow was a staggering one for the city, but her elasticity was such that she recovered in a remarkable way. The third began with the great meeting held in Glasgow after the funeral of Livingstone. Local missionary enthusiasm was aroused, and "from the missionary loins" sprang the

African Lakes Trading Corporation, to which is due in great measure the credit of exploring and opening up to trade the regions between the Zambesi and Lake Tanganyika.

The first traveller on whom we have been able to light is William Lithgow. He was born at Lanark in 1582, and served his apprenticeship to travel in Shetland, Bohemia, and Switzerland. In 1610 he left Paris on foot for Palestine, visited on the trip Tunis, Algeria, and other parts of North Africa, and returned by Hungary and Poland. From 1619 to 1621 he travelled through Ireland and Spain, and at Malaga was tortured as a spy. His work was published in part in 1619, and complete in 1632: *The Totall Discourse of the Rare Adventures and Painfull Peregrinations of long Nineteen Yeares*. The book is now very rare.

After the two centuries of stagnation in African exploration we find Alexander Gordon Laing in Sierra Leone. His mother was a Glasgow lady, though his father was from Edinburgh. As a young army officer he went to the West Indies in 1811, but in 1822 was exploring the Rokel River and parts of the interior of Sierra Leone. His famous journey from Tripoli by Ghadames and Tuat to Timbuktu and the Niger was cut short by his murder after leaving Timbuktu in 1826.

James Macqueen, born at Crawford in 1778, in 1796 was in Grenada managing sugar plantations, and made repeated voyages to all the West Indian colonies. In 1799 he became interested in the Niger through reading the travels of Mungo Park, and proceeded to collect information by questioning negro slaves, merchants, and slave agents about the upper course of that river, and came to the conclusion that it entered the sea in the Gulf of Guinea. He returned to Glasgow, and in 1821 helped to start, and at first edited, the *Glasgow Courier*. He published his accounts of the West Indies, and also his views on the Niger, and stimulated the Landers to exploration upon it. They made the voyage down the river for the first time, from Bussa, and with McGregor Laird of the Glasgow shipping people (born at Greenock, 1808) made an expedition for the opening of trade on it in 1854. Laird was also a partner in the initiation of the British and North American Steam Navigation Company, which ran across the Atlantic the first steamer that did not depend primarily on sail. He also founded the African Steamship Company, sailing up the Niger.

We may pass over the well-known achievements in Africa of David Livingstone to those of the missionary enterprise which continued his work. This was begun by way of the Shiré River and Lake Nyasa by the famous Dr. Laws of Aberdeen, and was largely financed from Glasgow. So also was the campaign of Dr. James Stewart, a medical graduate of Glasgow, who was in the field with Livingstone, and later explored Lake Nyasa. This missionary work had its commercial side in the African Lakes Corporation. Livingstone had ever an eye to the commercial possibilities of a region, and with a prophetic vision saw rich fields of cotton flourishing where the Arab slaver brought desolation to the land. To the Moirs, Fotheringham, and others, the Scottish servants of the Company, is due the opening up of the vast tract to commerce, the destruction of the slave traffic, the conversion of the

natives to peaceful pursuits, the development of the cotton and coffee plantations, and the production of oil and fibre. The Nyasa territory of the Company was acquired by the British South Africa Company in 1890, and its bank was absorbed by the Bank of South Africa; but it still carries on its operations in the Tanganyika Territory by the Shiré-Nyasa road, and its dividends before the War were well over 10 per cent. Sir William Mackinnon, who was also a pioneer in India, is likewise important in relation to Africa. Born in Campbeltown in 1823, he spent some time at the grocery trade there, and then came to Glasgow. Here he was first in a silk merchant's, later in the employ of an East India trader. In 1847 he went to Calcutta, and with one ship started a service between Calcutta and Rangoon, from which he developed the British India Line of steamers. In 1873 he initiated a service to Zanzibar and Aden, and in 1878 he gained the confidence of the Sultan of Zanzibar, and obtained from him a lease of 1150 miles of coast, and territory stretching inland to the Congo Free State over an area of 590,000 square miles, and including the Great Lakes from Victoria and Tanganyika to Nyasa. The Government refused to back him, on account of German activities, and what became German East Africa was lost to the Empire. Later he promoted the Imperial British East Africa Company with a lease of 150 miles of coast, including Mombasa, within which he abolished slavery, monopolies, and unequal treatment for the different nationalities in the field, but he was much hampered by subsidised German competition. He took a great interest in Stanley's expedition for the relief of Emin Pasha, raised more than half its cost, and generally pushed its interests. Till its failure he was a director of the City of Glasgow Bank, and at the crash was sued for nearly half a million, but was discharged of the liability, being shown to have no responsibility for the misfortune.

To Asiatic exploration, and particularly to the staff of the East India Company, Glasgow contributed several great men. James Macrae, the runaway son of an indigent washerwoman of Ayr, was Governor of Madras in 1725-50, and presented a statue of William III. to the city. Another Governor of Madras, and traveller in India, was Sir Thomas Munro, born in 1761, the son of a Glasgow Virginia merchant. After studying at the University, he joined the ranks of the Company's forces at Madras at the age of nineteen, rose rapidly, and was regarded as a very efficient servant of the Company. It is interesting to note that, when the city of Glasgow was fighting the renewal of the monopoly of the Company, he was strongly in favour of its renewal. Colin Campbell, Lord Clyde, may be mentioned also, if not as an explorer, at least as one who made a solid contribution to the stabilisation of British rule in India.

Of great interest is the work of George Bogle, a native of Bothwell (b. 1746), and alumnus of the University. He was an energetic servant of the East India Company under Warren Hastings, when the Bhutanese encroached on Cuch Behar in the north of Bengal. After their expulsion the influential head of a Thibetan sect, the Tashi Lama, acted as peacemaker, and Bogle was sent as head of a mission in 1774-75 to open

negotiations with a new ruler of Bhutan, and to establish commercial and friendly relations with him and with the Lama. He travelled by Cuch Behar and Buxa to Bhutan, where he was detained for a time by the Deb Raja or ruler. Eventually he was suffered to proceed, and went by the head of the Chumbi Valley into the valley of the Upper Brahmaputra or Maghang Tsanpo, on the north side of which he found the Lama. Their relations were very friendly, but Chinese influence at Lhasa defeated the main purpose of the mission, and Bogle returned to Bhutan, where he was able to arrange for the passage of goods, but not of European merchants, through the country. Two more missions to Bhutan followed under Dr. Alexander Hamilton, who had accompanied Bogle, and in charge of a fourth Bogle again penetrated Thibet in 1779. But he found that the Lama had gone to Pekin, where he shortly died, and Bogle died soon afterwards. The last mission of this series reached Thibet in 1782 under Turner, a relation of Hastings, but it was also unsuccessful commercially; and the recall of Hastings in 1785 brought the series to an end. Bogle was the first Westerner to enter Thibet, but the valuable information collected by him and Turner lay buried until published by Sir Clements Markham after the lapse of a century.

Claudius Buchanan, of Cambuslang (b. 1776) and the University of Glasgow, is said to have left Scotland to fiddle his way through Europe, but got no farther than London. He took orders at Cambridge, went out as a chaplain to the East India Company, became vice-provost of a new college established under Wellesley at Fort William, and took a great interest in the education and general enlightenment of the natives, which was discouraged after the departure of Wellesley. He made extensive tours on two occasions in south-west India, but was prevented by his engagements from indulging in missionary work. On returning to England, however, he excited interest in the state of the natives, and is the father of all that has since been done in missionary and educational work.

Turning to Asia generally, we come on the interesting figure of John Bell of Antermoney in the parish of Campsie, where he was born in 1691. He belonged to a family long connected with Glasgow, being descended, according to the long pedigree given by McUre, from Archibald Lyon of the house of Glamis, "the second promoter of trade here," who made a fortune in trade in the city. He was a student at the University, and went to Russia in 1714. As surgeon he accompanied an embassy to Ispahan in 1715, went with another through Siberia to Pekin in 1719, and in 1722 accompanied the army of Peter the Great to Persia. About 1734 he was in Scotland, but in the same year he had set up as a merchant in Petersburg, and started with a mission to Constantinople, sent in 1737 by the Russian Chancellor and the British Ambassador at Petersburg. Eventually he returned to this country, and in 1763 an account of his travels was published in two quarto volumes by R. and A. Foulis, the famous early printers of Glasgow. The book, *Travels from St. Petersburg in Russia to Divers Parts of Asia*, was written in the style of *Gulliver's Travels*.

The Clyde Valley made two notable contributions to the later.

exploration of Australia. John McKinlay was born at Sandbank in 1819, and at the age of seventeen went to New South Wales to his uncle's sheep station. He took up land near the South Australian border, and became known as an expert bushman. The search for the lost exploring party under Burke and Wills was in full swing, and in 1861 McKinlay was sent out on the quest by the South Australian Government. He settled the Lake Torrens question, and followed Gregory's trail to Cooper's Creek, near which he found the remains of a European and some relics. This was Gray, one of the lost party, but at first McKinlay thought it was one of the leaders. A note, which he found later, told of the recovery of King, the only survivor, by another party, and of the fate of Burke and Wills, and he proceeded on the second part of his programme, which was exploration in the interior towards Eyre Creek and Central Mt. Stuart. His first new discovery was the Mueller River, and he pushed north over quite new country, finding new lakes, streams, and ranges, and was much troubled by floods, of which the aborigines had warned him, but in which he found difficulty in believing. He seems to have struck the Leichardt River, and to have seen, but not reached, the Gulf of Carpentaria. Disappointed of expected relief on the coast, he turned eastward and reached Port Denison in Queensland in dire straits, having eaten most of his animals, but with all his party safe, in September 1862. He made a second journey in the Lake Carpentaria region later, but was much hampered by a wet season.

The cross-continent journey was made in the opposite direction by William Landsborough, born at Stevenston, the son of David Landsborough the botanist. Having emigrated to Australia, he was first a squatter, but took great interest in travel, discovered Nebo, and explored the Peak Downs, Fort Cooper, and Nagoo in Queensland in 1860. In 1861 he explored the sources of the Thomson River, and surveyed the Gregory and Hubert Ranges. Appointed to the charge of a search for Burke and Wills, he made a preliminary trip of 200 miles from the Albert River towards Central Mt. Stuart, and in 1862 crossed the continent, discovering many rivers and much good country, but doing little in the way of searching for the missing explorers.

Among the crowd of Scotsmen who were employed by the Hudson Bay Company we have failed to light upon any from Clydesdale. William Alexander of Menstrie, Earl of Stirling, a student of Glasgow, had a grant of "Nova Scotia" from James I. This is the first mention of the name, and the occasion on which the distinction from New England was made; but the French were at the time in occupation, and no effort seems to have been made to dislodge them. Another Glasgow alumnus, James Dalrymple, was made a Nova Scotian baronet by Cromwell, but he does not appear to have taken any advantage of the Protector's real if brief seizure of the country. James McGill, the founder of McGill College, was born in Glasgow in 1744, and engaged in the North-West trade with the North-West Company founded by Simon McTavish of Montreal. Alexander Wilson, the Paisley weaver and ornithologist, emigrated to New Jersey, where he was weaver, pedlar, and teacher by turns. In his pursuit of bird-lore he made a trip down the Ohio

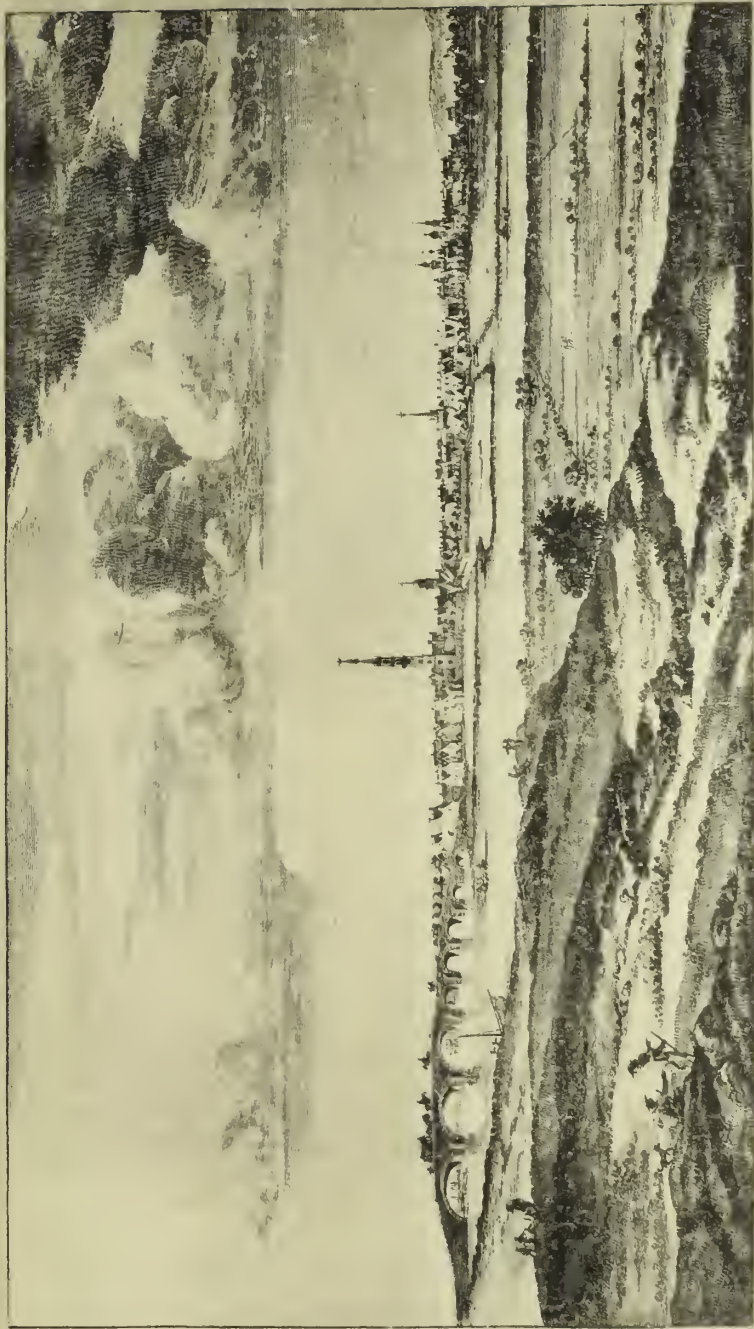
in a canoe, and a painful overland journey through the Lower Mississippi Valley to New Orleans. A turbulent Irishman, James Macsparran, took a Glasgow degree, and then went as a missionary to Rhode Island. America cannot have treated him kindly, for he wrote a work, *America Dissected*, in which he issues a solemn warning to unsteady folk not to emigrate because of "bad climate, bad money, danger from enemies, pestilent heresies."

Many of the emigrants and troublesome deportees to the West Indies were Scots, and there was an early trade of considerable amount between Glasgow and the islands; but there is little to be learned about its pioneering. James Macqueen, we have seen, did his travelling here, and another voyager was Michael Scott, author of *Tom Cringle's Log* and *The Cruise of the Midge*, which are full of descriptions based on his observations. Born at Cowlares, and educated at the High School and the University, he became manager of estates in Jamaica. In 1810 he took up business in Kingston, and did much travelling by sea and land. He returned to Glasgow, where his father was a merchant, and was in business there after 1822.

Of Polar explorers we need only mention Sir Joseph Hooker, of Sir James Ross's expedition to the Antarctic, who visited also New Zealand, Tasmania, India and the Himalaya, and the Western United States. To Lamont of Knockdaw Castle on the Holy Loch is due the removal from the Admiralty Charts of much mythical detail of the Barents Sea. He visited many of the sounds of Spitsbergen, including the difficult Wybe Jansz Water, in his frail yacht *Ginerva*, and made geological collections and valuable notes on the fauna. He cruised north in two seasons, and with Sir Martin Conway and his parties made the main British contributions to the geography of Spitsbergen.

We shall look at the foreign trade of Glasgow under three natural heads: first, the period prior to the Union of 1707; then the interval between that and 1775, the date of the beginning of the American War of Independence; third, the modern period, which begins at that time.

Early Period, till 1707.—Except for slight effects due to the stimulus given by the Union of the Crowns and the short period of free trade during the Commonwealth, the commerce of Glasgow continued till 1707 in its limited primitive state. There was probably some manufacture of coarse woollens, chiefly for home consumption, as suggested by the name "Fullers' Gate"; but the finer fabrics and articles of manufacture were imported from England and France. Gibson states that the city had some maritime importance in 1546 (p. 203), when Scots vessels engaged in privateering against the commerce of England. The year 1567 is mentioned as remarkably successful for the fishing, and the export to Rochelle of herring is given as 1700 lasts of 12 barrels each. By 1597 there is a record of six vessels belonging to the port, of tonnage from 21 to 92, and totalling 280, and wine and timber (from the Highlands) are mentioned as articles of trade (Marwick, p. 44). The period from 1630 to 1660 seems to have been prosperous, and trade seems to have increased up till the time of the Union. McUre states that one Walter Gibson chartered the *St. Agat* of Holland,



Facies Civitatis GLASCOE ab Aulstro. The prospect of the Town of GLASGOW from ^e South.

450 tons, loaded her with 300 lasts of herring (12 barrels to the last), costing £6 sterling per last, and disposed of the cargo for a barrel of brandy and a crown per barrel at St. Martin's in France. The return cargo was salt and brandy, and sold for such a sum that Gibson bought the ship and two other large vessels, with which he carried on a large trade with "France, Spain, Norway, Swedland, and Virginea." He is said to have been the first to import iron direct to Glasgow, earlier supplies having come with dyestuffs from Stirling and Bo'ness (McUre, p. 167). There follows a list of over a hundred trading to "Virginea, Carriby-islands, Barbadoes, New England, St. Christophers, Monserat . . ."

The Tobacco Period, 1707-1775.—Although at least the commonalty of Glasgow was sufficiently opposed to the Union to indulge in rioting, the merchants were very much alive to the value of the colonial trade. By the beginning of the eighteenth century the manufactures were coming into being. Soap works had been established in 1667, sugar-boiling works in the same year. Tanning, making of green bottle-glass and of ropes, and brewing, were old-established industries. Printing in Glasgow dates from the seventeenth century. Trade was on a firm footing, and the merchants were in a position to exploit the new markets without delay. In 1707 a company of merchants hired a ship of Whitehaven, loaded her with merchandise in charge of a supercargo, and sent her out to Virginia. The plan was to exchange the outward cargo for tobacco until a full cargo had been accumulated, and then to return whether the exported goods had been exhausted or not; and this was the general plan of the early Virginia trade. It was safe, returns were rapid, and the traders were generally so frugal in their methods that they were soon able to oust the English from the French market, and even to undersell them in their own towns. For a time English vessels were employed exclusively, but by 1718 Glasgow owned ships engaged in the American trade, and had begun to be considered a port of no mean order.

The English traders naturally did not welcome the competition of the Scots, and in 1721 those of London, Liverpool, and Whitehaven presented a petition to the Lords of Treasury complaining that the Scottish merchants were guilty of defrauding the customs. After inquiry the court refused to discuss the cause, finding "that the complaints of the merchants of London, Liverpool, and Whitehaven were groundless, and that they proceeded from a spirit of envy, and not from a regard to the interest of trade, or of the king's revenue." The matter was now raised in the House of Commons, and a commission sent north to investigate reported in 1723. The replies of the Glasgow merchants are said to have been overlooked, and new officers to have been appointed at the ports with private instructions to harry the trade out of existence. Law-suits and other vexations followed, and the import of tobacco languished until 1735, when it recovered slowly.

New methods were now adopted. The old supercargoes were superseded by agents on the American coast, and these, in their anxiety to secure the trade in spite of English competition, furnished the planters with credit on the security of the growing crops. But competition soon

made the credit unlimited, the trade became speculative, involved the sinking of much greater capital, and a year and a half were required to get returns. A consequence was that the debts to Glasgow at the time of the Declaration of Independence were extremely heavy, and the loss of capital to the city was staggering. Nevertheless the volume of the trade waxed greatly, and in the year before the war it reached its maximum of 57,143 hogsheads, or about 57 million lbs. In the year 1771-72, according to Gibson, the total import was some 46 million lbs., and the re-export of unmanufactured tobacco was nearly 44 million lbs., with 10,000 lbs. manufactured. In the following year it is stated that of the 90,000 hogsheads imported into the United Kingdom, the share of Glasgow was 49,000. Three-fourths of the import came from Virginia.

During the tobacco period the manufactures of the city increased greatly, and those already existing expanded; to wool and linen spinning and weaving, the manufacture of cotton was added, and bleaching and printing on fabrics was developed. Iron, brass, and copper work began, delf and stoneware, brushes, furniture, and saddlery were made. Gibson (p. 203 *et seq.*) gives a very full and satisfactory set of statistics for the year 1771-72. According to him there were 67 "ships, brigantines and sloops" belonging to the Clyde. Of these, fifteen were engaged in the Virginia trade, four sailed to Jamaica, two each to Antigua and St. Kitts, one to Barbados, three to Boston, six to London, four to Southern Europe ("Streights"), one to Gibraltar, two to Holland, seven to Stockholm. A "galley" is mentioned as having been built much earlier, and McUre says "William Simson, born at St. Andrews about one hundred years ago (written in 1736), . . . built two ships at the Bremmylaw, and brought them down the river the time of great flood." But the *Ljone* mentioned above was built at Belfast, and it is only in 1716 that the real parent of the long line of Clyde ships left the stocks at Crawford's Dyke, a sixty-tonner, built for the American trade. She crossed the Atlantic in 1718. It was in this period also that the regular West Indies trade began in earnest. Earlier, an occasional vessel had carried out herrings and a few bales of goods, returning with sugar and rum; but in 1732 was started an agency trade with credit arrangements. Lastly, banking began in the city in this period.

For full details we must refer the reader to Gibson. The list of commodities is extensive. From Southern Europe came salt, 40,000 bushels (round numbers); wine, mainly Spanish and Portuguese, 43,000 gallons; cork, lemons, olive oil, raisins and dainties. The return was mainly tobacco. From Russia, Sweden, and Norway came potash and other ashes, linen yarn, fabrics, and undressed flax, timber, and naval stores, together with some 600 tons of bar iron. Tobacco, linen and woollen fabrics, and sugar were the main exports. Ireland sent salt beef, tongues, pork and bacon, butter, tallow, hides and skins, oats and oatmeal, linen, and received ale, herring, sugar, tobacco, rum, fabrics, soap, glass, coal, salt, iron, and many small items. The imports from North America were timber—mahogany, pine, ash, oak, maple, etc.—turpentine, tar and pitch, train oil, ashes, indigo, skins and pelts. The



main import was the tobacco. Cotton amounted to 100 lbs. There were over 1000 tons of pig and bar iron. Exports to the American Colonies were ale, wines, manufactured tobacco, wrought iron, metal, hard and stone ware, fabrics, clothing, and furniture, soap, candles, glass leather, stationery, fish. From the West Indies came sugars (2400 tons), cotton wool (60,000 lbs.), indigo, logwood, fustic, coffee, ginger, and rum, for which were exchanged the same commodities as those sent to America. Re-exports were large, and entrepot trade important: tobacco 44 million lbs., Irish linen 73,000 yards (70 per cent. of that imported), rum 129,000 gallons (of 180,000 imported), spices, sugar, iron, and mahogany. Home products and the produce of local industry were a considerable proportion of exports: herring 15,000 barrels, soap 30,000 lbs., woollens 575,000 lbs., calico, cambric, and printed linen, thread and twine, candles, paint, leather, paper and books, cabinet ware, furniture and glass. Coal exports amounted to 1031 chalders, say 1200 tons!

Gibson states that there was a large eastward trade to and from London to the account of Glasgow merchants, but that this cannot be estimated. Defoe, in his account of Glasgow as seen on his tour in the north, states that the main disadvantage under which the Scots lay in relation to the English in the American trade was their greater difficulty in marketing imports locally, but that they met it by the establishment of a port at "Alloway" in the Forth for direct export to Holland and London. Gibson is unable to put a value on the foreign trade, but remarks that about a fourth only of the exports are Scots manufactures on account of inattention to industry. Defoe shows, however, that the Glasgow merchants could make up "sortable cargoes" in spite of the hopes of English merchants to the contrary, though not quite the same as those sent from England, and points out that in the production of muslins and gloves the Scots had the advantage both in quality and price. Gibson estimates the Clyde tonnage as over 60,000 in 1772.

Modern Period, after 1775: The Manufacturing and Shipbuilding Era.—An immediate consequence of the improvement of the Clyde (cf. p. 44) was the increase of shipping and the beginning of shipbuilding. The progress of Glasgow as a shipping centre and as a centre for the export of ships is illustrated by the tables below.

TABLE I.—Registered Tonnage of the Chief Ports of the United Kingdom, 1919.

	No. of ships.	Tonnage.	Average tonnage.	Percentage of ships over 3000 tons.	Percentage of tonnage over 3000 tons.	Percentage of U.K. tonnage.
London, .	3549	3,386,318	954	11·4	48·2	20·7
Liverpool, .	1843	2,297,723	1247	17·1	68·7	14·0
Glasgow, .	1210	1,393,236	1151	16·4	58·4	8·5

TABLE II.—Average Export of New Ships, with their Machinery, at the Chief Ports, 1909-13.

	Gross tonnage.	Value with machinery.	Percentage of tonnage of total U.K. Export.
Glasgow, . .	93,586	£2,020,798	25·9
Tyne Ports, . .	69,183	1,571,752	19·1
Hartlepool, . .	23,279	1,258,227	6·4
Belfast, . .	13,326	272,938	3·7
Barrow, . .	6,914	930,220	1·9

The older industries continued to develop, and newer to arise. Thus Glasgow became a leading centre for the export of soap and chemical products. But the staple trade was no longer in tobacco. The existing trade with the West Indies was the first to be developed, and cotton wool was the main raw material imported. Together with the dye-woods it gave Glasgow industry a bias in favour of textile and, particularly, of cotton manufacture. But the merchants had learned the evil of depending on a single staple, and trade was developed on more cosmopolitan lines. As early as 1816 the *Earl of Buckingham*, 600 tons, a sailing ship, was despatched to Calcutta, the first ship to leave the Clyde for India direct. She led the way that was quickly followed by many other vessels. India, the United States (for cotton), Africa and Australia in due course were regularly visited by Clyde shipping. In the middle of the century cotton, iron, coal, and agricultural machinery, with chemical products, were the chief articles of export, and the trade-routes radiated to all the settlements of the commercial world. Cotton and agricultural machinery have largely disappeared from the port's bill of lading, but the variety remains, and defies quotation here. We conclude with tables showing the volume of the overseas trade of the city compared with that of the main ports of the kingdom.

TABLE III.—Average Tonnage entered and cleared from overseas at the Main Ports of the United Kingdom, 1909-13.

	Thousand Tons.			Percentage of Total for U.K.
	Entered.	Cleared.	Total.	
London, . . .	11,618	8,879	20,498	14·2
Liverpool, . .	7,661	7,027	14,688	10·2
Cardiff, . . .	6,040	9,025	15,060	10·5
Tyne Ports, . .	5,996	6,880	12,876	9·0
Southampton, .	4,872	4,609	9,481	6·6
Hull, . . .	3,808	3,462	7,270	5·0
Glasgow, . . .	2,075	3,341	5,406	3·8

TABLE IV.—Average Exports, Imports, and Entrepot Trade of the Chief British Ports, 1909-13. (Millions sterling.)

	London.	Liverpool.	Hull.	Manchester.	Southampton.	Glasgow.
Imports,	231·4	166·7	44·3	32·4	22·7	16·0
Exports, U.K. produce,	84·4	149·9	25·5	19·0	18·5	31·2
Exports, Foreign and Colonial produce,	53·5	27·3	5·5	0·3	6·9	0·4
Total,	369·3	345·9	75·3	51·6	48·2	47·6
Percentage of U.K. total,	29·3	27·2	5·9	4·1	3·8	3·8
Trade per head of Population,	£50	£461	£270	£72	£405	£61

Trade per head of U.K. £28.

TABLE V.—Nature of Glasgow Trade, 1909-13.

	Percentage of Glasgow Trade.	Percentage of total U.K.
Imports,	33·6	2·3
Exports, U.K. produce,	65·5	6·9
Exports, Foreign and Colonial produce,	0·8	0·0

The tables show that Glasgow is rather an exporting than an importing port, that its entrepot trade has gone, and that it is less exclusively a seaport than any other of the great ports except London, less even than Manchester.

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THE CARTOGRAPHY OF GLASGOW.

(With List of Old Maps and Illustrations Reproduced.)

By JOHN ARTHUR BROWN,

Hon. Sec. of Glasgow Archæological Society.

A HISTORICAL note on the cartography of Glasgow may begin with a reference to Timothy Pont's survey (1596), for there is no existing plan or view of the city earlier than that delineated in Pont's map of

the Nether Ward of Clydesdale and Barony of Glasgow published in Blaeu's Atlas of 1654 (see Map 1). This view of Glasgow cannot be described as an accurate plan, the few streets shown being very roughly laid down, and as the scale of the map is small it has only been possible to indicate a few of the principal buildings, such as the Cathedral, the Tron and Blackfriars' Churches, and the old Bridge over the Clyde with an arched gateway at the south end (see the lower figure in Plate V.). This is the only plan of Glasgow in Blaeu's Atlas, except a smaller one shown in the map of the Barony of Renfrew. There is an entry in the Minutes of the Town Council of 12th June 1641 ordaining the Treasurer to pay James Colquhoun "fyve dollouris" for drawing of the portrait of the town to be sent to Holland; but if this "portrait" was executed for Blaeu's Atlas, it does not appear to have been published.

In his Map of the River Clyde (1734) John Watt, Senior, shows a few streets of Glasgow, but the scale is too small to make the sketch of much practical value (Map 2). James Barry's Plan of the River Clyde from Dumbarton to Rosebank, with a projection of the navigation by John Smeaton (1758), indicates the principal buildings of Glasgow, but no street lines are shown. It is interesting to note the islands in the river shown in this map.

Of sectional plans of the city within the period 1765 to 1777 there are two which are interesting, although they cover only small areas. These are (1) A Plan of part of ye City of Glasgow and course of the Burn Molendinar, produced in Fleming's case against the Magistrates of Glasgow 1765-68 (Fig. 2), and (2) A Plan of Sundry Streets in Glasgow relating to a road in dispute between the College and the inhabitants, surveyed by W. Douglas, December 1777. Both of these plans have been reproduced in Glasgow *Burgh Records*, vol. vii.

The first plan of the whole area of the city laid down on a scale sufficiently large to show the more important buildings was made in 1773 by Charles Ross of Greenlaw, Paisley (Fig. 7). His Map of the Shire of Lanark contains an inset of Glasgow on a scale of about six inches to the mile. It is a good piece of draughtsmanship and useful for identifying buildings existing at the period. It shows a block plan of the buildings of the Archbishop's Castle, with Beaton's tower, offices, and the Great Gatehouse. This plan of Glasgow has been reproduced in a number of editions, and a copy will be found in Glasgow *Burgh Records*, vol. i.

In 1778 John McArthur's fine four-sheet Plan of the City of Glasgow, Gorbells, and Calton was published. It is on a scale of 230 feet to the inch, and the title is ornamented with a sketch of the Cathedral Church, the ruins of the Castle, and the Dean's Manse. The map, owing to its accuracy and the amount of detail shown, forms a valuable item of the cartography of Glasgow. It shows the precincts of the Castle (then in ruins) and its garden, with Beaton's tower, St. Nicholas' Hospital buildings and yard, and a number of the prebendaries' manses. A reduced copy of the plan was issued in 1779 (Map 3), and a subsequent edition in 1860 by David Smith, C.E. There is a reproduction of the reduced plan in Glasgow *Burgh Records*, vol. vii.

XXI



A View of Glasgow from the West
J. Macdonald Glasgow 1758

XXII.



James Barry, surveyor in Glasgow, published in 1782 a Plan of the City of Glasgow, Gorbells, Caltoun and Environs, with an exact delineation of its Royalty, on a scale of 500 feet to the inch. A feature of this plan is the numbering of the Royalty march stones. It covers a larger area than McArthur's Map, especially on the north and south of the city, but being on a smaller scale it shows less detail. Barry was a surveyor in extensive practice, and laid out St. Enoch Square in building lots and several new streets north and south of Argyle Street. Previous to the issue of this map, Barry had supplied a plan of the city and of the villages of Caltoun and Gorbells, with a part of the adjacent country ($19\frac{1}{2} \times 15$), for Gibson's *History of Glasgow*, published in 1777. The plan of 1782 is reproduced in *Glasgow Charters*, vol. ii. (Map 4).

In 1795 Thomas Richardson's Map of the Town of Glasgow and Country seven miles round was published on a scale of $1\frac{1}{2}$ miles to the inch. Reference to estates, with their proprietors, are given in the margin, and the map is useful for its survey of the environs of the city. It was reproduced in 1883 by W. and A. K. Johnston ($20 \times 26\frac{1}{2}$), and published in *Glasgow Past and Present*, vol. iii.

In 1797 a Plan of the City of Glasgow from actual survey, on a scale of 1000 feet to the inch, was published in Denholm's *History of Glasgow*, and re-issued in subsequent editions of that book. And in Chapman's *Picture of Glasgow*, published in 1806, will be found a plan of the city on the same scale, with numbered references to the public buildings.

An excellent map of the city and suburbs in six sheets, by Peter Fleming, land surveyor and member of the Philosophical Society of Glasgow, was published in 1807, on a scale of 200 feet. It shows a great amount of detail and the boundaries of parishes, and has an inset plan of Glasgow in 1778. A reduced copy of the map was published in 1808 (Map 5), with a table of references to public offices and buildings, and is reproduced in *Glasgow Burgh Records*, vol. ix. Another edition of the Map of 1807 in six sheets, revised by David Smith, was brought out in 1821. This is a very fine map on a scale of 250 feet.

A Map of the Ten Parishes within the Royalty and the Parishes of Gorbals and Barony of Glasgow, generally known as "Cleland's Map," prepared for his Enumeration of the Inhabitants, was published in 1822 on a scale of 6 inches to the mile, with inset map of the Barony Parish and Royalty of Glasgow laid down to a small scale. This map, containing interesting details regarding the Royalty, the Parishes, and the Barony of Provand, bears to be constructed by David Smith, surveyor, from other maps and plans of acknowledged accuracy, under the direction of Mr. Cleland. Another edition of this map, but without the name of the surveyor, was published in 1831. David Smith's Plan of the City of Glasgow and its Environs, with all the latest improvements, actually surveyed, on a scale 400 feet, was issued in 1828. It is an excellent piece of work, and has references to the parishes. Smith brought out another plan of the city and its environs in conjunction with James Collie in 1839, on the same scale. This is a well-engraved map.

A Plan showing the Parliamentary Boundaries of the City of



FIG. 7.—Ross's Plan

[illegible]

Glasgow will be found in the Municipal Corporation's Report of 1832. This plan is reproduced in *Glasgow Burgh Records*, vol. xi.

A Map of the City of Glasgow, showing the Parliamentary Boundaries, Parishes, Police Wards of the City and Suburbs, etc., with Intended Improvements, by George Martin, Civil Engineer and Surveyor, was engraved and published by W. and A. K. Johnston in 1842, on a scale of 400 feet. This is a most excellent map, and has an inset of Glasgow in 1778.

In 1848 the first of a series of maps of the city and suburbs appeared in the Official Post Office Directory of Glasgow, the earlier maps being engraved by Joseph Swan. These Directory maps were much improved when in 1865 their preparation was committed to John Bartholomew, F.R.G.S., and the maps issued annually thereafter on a scale of six inches to the mile have been carefully revised from Ordnance and actual survey.

Notice must also be taken of a map of the country for ten miles round Glasgow on a scale of one mile to the inch by Edward Meikleham, published in 1852. This is a useful map of the environs of the city, with a good deal of detail.

Although issued subsequently to the first Ordnance Survey of the city and suburbs, and accordingly outwith the period with which this article deals, it would be unpardonable in an account of the cartography of Glasgow to omit a reference to the following maps, which form most useful aids to a study of the history and topography of the city:—

- (1) Map of the City of Glasgow, showing the original area in the twelfth century and the areas which have been added from that period (42 × 39). By R. Renwick, Town Clerk Depute, and A. B. McDonald, City Engineer. Engraved by John Bartholomew and Co., and published by the Corporation of Glasgow in 1909.
- (2) Sketch Plan of the City of Glasgow, compiled in illustration of Protocols of the Town Clerks of Glasgow 1547 *et seq.* (18 × 16). By A. B. McDonald. Published in *Glasgow Protocols*, vol. i., 1894.
- (3) A Map of Glasgow and adjoining district compiled to illustrate "Charters and Documents relating to the City of Glasgow 1175-1649" (26 × 19). By A. B. McDonald. Published in *Glasgow Charters*, vol. i., Pt. i., 1897 (Map 6).
- (4) Sketch Plan showing sites of Principal Buildings and Places in the vicinity of Glasgow Cathedral in the sixteenth century, prepared for "Glasgow Protocols, 1530 to 1600" (20 × 16). By A. B. McDonald. Published in *Glasgow Protocols*, vol. xi. 1900.

The accompanying Chronological List of Maps of Glasgow is not intended to include every map published within the period embraced, many of which are on a small scale and of no enduring interest; it is hoped, however, that the list given may form a guide to the more important maps of the city and suburbs. The principal maps are indicated by authors' names in small capitals.

CHRONOLOGICAL LIST OF MAPS OF GLASGOW

PRIOR TO THE ORDNANCE SURVEY OF 1857-62.

	Surveyor.	Date.	Size.	Engraver and Publication.
1	Timothy Pont	1596	...	In Blaeu's Atlas, 1654.
2	John Watt, Sen.	1734	12 × 15	A Map of the River Clyde. Published by John Watt, Junior, 1760. In Marwick's <i>The River Clyde and the Clyde Burghs</i> , 1909.
3 ²	James Barry } John Smeaton }	1758	15 × 30	Engraved by R. W. Seale. A Plan of the River Clyde.
4	Anonymous	1765	22 × 19	A Plan of part of the City of Glasgow and Course of the Molendinar Burn. In Glasgow <i>Burgh Records</i> , vol. vii.
5	Charles Ross	1773	12 × 11½	Inset to Map of the Shire of Lanark. Engraved by George Cameron. Reproduced in Glasgow <i>B. R.</i> , i.
6	W. Douglas	1777	7¼ × 6	Plan of portion of the City surrounding the College. Engraved by J. Urie. Reproduced in Glasgow <i>B. R.</i> , vii.
7	James Barry	1775	19½ × 15	Engraved by Andrew Ready, and published in Gibson's <i>History of Glasgow</i> , 1777.
8	JOHN McARTHUR	1778	38 × 50	Engraved by Alexander Baillie and James Lumsden.
9	JAMES BARRY	1782	37½ × 26½	Engraved by Alexander Baillie. No date on this map, but it is usually ascribed to the year 1782.
10	Anonymous	1783	7 × 8	In MacGregor's <i>History of Glasgow</i> , etc.
11	Anonymous	1790	14½ × 22	
12	Thos. Richardson	1795	24 × 31½	Engraved by Kirkwood. A Map of the Town of Glasgow and Country 7 miles round. Published by James Gillies. Reproduced in <i>Glasgow Past and Present</i> , vol. iii.
13	Anonymous	1797	7 × 11¼	In Denholm's <i>History of Glasgow</i> .
14	Anonymous	1806	7 × 11½	In Chapman's <i>Picture of Glasgow</i> .
15	PETER FLEMING	1807	6 shs. each 24 × 23	Engraved by R. Scott. Inset Plan of Glasgow in 1779.

	Surveyor.	Date.	Size.	Engraver and Publication.
16	Peter Fleming	1808	$10\frac{1}{4} \times 17$	Engraved by R. Scott. This is a reduced copy of the Map of 1807. Reproduced in Glasgow <i>B. R.</i> , ix.
17	PETER FLEMING } DAVID SMITH }	1821	6 shs. each 24×23	Engraved by R. Scott. Parishes shown.
18	DAVID SMITH	1822	$29 \times 16\frac{1}{2}$	Engraved by Kirkwood and Son. A Parish Map prepared for Cleland's Enumeration of the Inhabitants.
19	Anonymous	1826	$15\frac{1}{2} \times 12$	In <i>Glasgow Delineated</i> , 1827.
20	DAVID SMITH	1828	$24 \times 36\frac{1}{2}$	Engraved by R. Scott. A Parish Map.
21	ANONYMOUS	1831	$17 \times 29\frac{1}{2}$	A Parish Map prepared for the Enumeration of the Inhabitants.
22	Anonymous	1832	20×31	In Report on the Burgh of Glasgow (Municipal Corporations), 1832.
23	DAVID SMITH } JAMES COLLIE }	1839	$23\frac{1}{2} \times 37\frac{1}{2}$	Engraved and published by R. Scott, Edinburgh, and John Symington and Co., Glasgow.
24	Andr. Macfarlane	1841	32×26	A Map of the Burgh of Barony of Anderston.
25	GEORGE MARTIN	1842	46×72	Engraved by W. and A. K. Johnston. With Inset of Glasgow in 1778, Parishes, etc.
26	Anonymous	1844	$13\frac{1}{2} \times 19$	Litho. by Nicol. Published by Francis Orr and Sons. Reprinted, undated, by W. R. M'Phun.
27	Anonymous	1846	18×28	Parliamentary and Municipal Franchise Map. Published by H. Wilson and James Lumsden and Son.
28	Anonymous	1847	$8 \times 14\frac{1}{2}$	In Pagan's <i>Sketch of the History of Glasgow</i> .
29	Anonymous	1848	$15\frac{1}{2} \times 22$	Engraved by Joseph Swan. First Post Office Directory Map.
30	Anonymous	1848	11×19	Published by M'Phun.
31	Edw. Meikleham	1852	23×25	Map of the Country for 10 miles round Glasgow. Engraved by Maclure and Macdonald.

The following maps mentioned in the above article are reproduced here :—

- Map 1.—The River Clyde and Adjoining District, compiled from Blaeu's Atlas. (From Marwick's *River Clyde*.) Frontispiece.
- Map 2.—Watt's The River of Clyde, and the entry to the River and Firth of Clyde. P. 28.
- Map 3.—McArthur's Reduced Plan of the City of Glasgow, Gorbells and Caltoun. P. 40.
- Map 4.—Barry's Plan of the City of Glasgow, Gorbells, Caltoun and Environs. P. 64.
- Map 5.—Fleming's Reduced Map of the City of Glasgow and Suburbs. P. 72.
- Map 6.—Plan of City in 1650 (at end).
- Fig. 2.—Plan of part of the Burn Molendinar. Pp. 8-9.
- Fig. 7.—Ross's Plan of Glasgow, 1773. Pp. 70-71.

The following illustrations of early Glasgow also appear :—

- Plate I., p. 6.—*A View on the Molendinar*, 1769, showing a small and ancient arch believed to have been one of the oldest pieces of masonry in Glasgow. The position of the burn, which is now built over, in relation to the site of the Cathedral, is well shown. From Gemmel's Portfolio of *Early Views of Glasgow*.
- Plate II., p. 22.—*A View of Glasgow from the South-East*, 1782, showing the Cathedral, Bishop's Palace, the Drygait (cf. Map 6), some of the drumlins marked on Fig. 1, p. 5, and the site of the early town. Cf. McArthur's Map (3). From Gemmel.
- Plate III., p. 38.—*A View of Glasgow from the South-West*, 1764, showing the old windmill and the early condition of the river, also the Gorbells, with the Brig and the wicket gateway, and the Old Green of Glasgow now built over. From Gemmel.
- Plate IV., p. 62.—*Glasgow Bryg*, 1680. This is Bishop Rae's bridge, built about 1340, and is that shown in Map 1; The Merchants' House and Steeple (the latter still stands), the Tower of the old Hutcheson's Hospital, Tolbooth Tower (still standing), and the north-west tower and spire of the Cathedral are shown. Slezer's *Theatrum Scotiae*, 1693.
- Plate V., p. 68, Upper Figure.—*View of Glasgow from the West*, 1758, showing Argyle Street as a tree-bordered country lane (cf. Map 3).
Lower Figure.—*Glasgow Harbour*, 1760, showing the old bridge and Glasgow Green (cf. Plate II.). From Gemmel.
- Fig. 3, p. 27.—*Glasgow College, with Blackfriars' Church*, in 1669. In 1460 James, Lord Hamilton, bequeathed a tenement in the High Street, with four acres of ground adjoining, for the use of the College. In the building erected here the classes continued to meet till 1864. The site is now covered by a goods station. From Slezer's *Theatrum Scotiae*, 1693.
- Fig. 4, p. 36.—*View of the Trongate from the East*, 1770, showing the old Tolbooth, which was used as Council Chamber, Court, and Prison, the steeple of the first Hutcheson's Hospital, the steeple of the Tron Church, and the old Coffee House. From Gemmel.

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L'ENVOI.

By Sir HALFORD J. MACKINDER, M.P.

I HAVE been asked to write a note on the future of Glasgow. It seems to me that on this subject there is only one thing which can be said with certainty, and it is that the geographical circumstances which in the past have conduced to the growth of the city would not in this twentieth century suffice to create anew in this locality a great centre of activity, if for any reason, whether of military defeat or economic strife, Glasgow were now to cease to flourish. The city may to-day be likened to a man in the full tide of middle life who easily counters his youthful competitors because of his long start, but should he fail for any reason will discover that he has not their power of recuperation.

It is necessary to invoke momentum from the past in order to explain the greatness of many of the oldest centres of urban life. Geographical analysis alone will not be enough without the inclusion of "compound interest" on the original geographical capital. You may analyse the position of Glasgow and show that it was founded on the nearest solid ground to a ford across the Clyde, and that the paths up and down the valley here crossed the paths from the hunting grounds of Strathmore and Kyle; but you have so only given the reasons for the placing of a big village. St. Ninian and St. Mungo established a home of missionaries at this focus of pathways into the wild, and so you explain a little episcopal city. Under the protection of her bishops, Glasgow's market outstrips Renfrew, Dumbarton, and Rutherglen, so that the traffic comes by the converging paths from farther afield; you have still only added a High Street of shopkeepers to a cathedral close. The Union of 1707 gives Glasgow the opportunity of importing the sugar and tobacco of Scotland; you have now accounted for Jamaica Street. Finally the exploitation of the Lanarkshire coal and iron gives you an industrial area with a few hundred thousand workers. But Kelvinside and Clydebank, the city of a million within and half a million more without the municipal boundary, is only to be explained by the fact that being a great going concern Glasgow has changed her geographical environment, has brought the seas to her doors and made tributary distant ores and granaries. It is in short an independent geographical fact that you have beside the Clyde not only deposits of coal but in these days also a deposit of human energy and skill and habit of working together. The result is that in a far corner of the damp and chilly north, in a little sterile land, beside an unnavigable mountain torrent, we see a great world-centre. No one would have deepened the Clyde unless Glasgow had already been there. To him that hath shall be given.

To say that Glasgow flourishes because the Scottish race has Scottish qualities is only half an explanation; Scots show no disinclination to found Dunedins in distant and more open lands. It is conceivable that for sentimental reasons the Scottish race scattered over the world might

have maintained a spiritual home in Edinburgh, a place of education for their young and of leisure for their old ; the Jewish race has such an idea in regard to Jerusalem under the mandate of Britain. But Scots are attracted to Glasgow and stay there in order to make money.

In each successive phase of civilisation Glasgow has flourished up to the possibilities of the time, and was therefore ready to seize the opening chances of the succeeding age and so to gather more than her due share of prosperity as measured by geographical probabilities. It is because Glasgow is a great running concern, highly organised, impossible of bodily removal, that the world's orders for new ships come in such large measure to the Clyde. Mohammed had to go to the mountain, but a town of Scottish Mohammeds has compelled the mountains to come to it in the shape of foreign iron ores.

Geographical momentum is, of course, merely a particular aspect of a universal truth. Newton's first law of motion states that truth in its simplest mechanical form ; the tendency of modern physics is to resolve all matter into continuing movement. In the realm of mentality the same law holds ; man is a creature of habit and his ruling passion is strong even in death. Society by interlocking human habits multiplies in a steep geometrical ratio the results of psychological momentum or inertia, call it which you will. In commerce we speak of customers and we buy and sell goodwill. Among geographers it is a commonplace that no human settlement is more difficult to supplant than an established market ; every buyer and seller trusts to find the most advantageous bids and offers at the customary place of concourse.

There are cities such as Chicago and Winnipeg which are conditioned by great geographical features commensurate with twentieth-century methods of human organisation. Lake Michigan stretches as a broad gulf for three hundred miles southward and bars the eastern transport of grain from a vast corn-growing region ; therefore the railways converge to a focus as they round the end of the water on their way to the consuming populations. Were Chicago to be utterly destroyed it is certain that a new Chicago would at once rise upon the ruins. In a new country the importance of cities still depends as a rule directly upon geographical advantages. In the historic Mediterranean, on the other hand, we have examples both of long-continued geographical compulsion and of evanescent momentum. Carthage was established where some hillocks and a defensible peninsula caught the eye of the Phœnician colonist, and a small harbour and a fertile valley were at hand. As Carthaginian society acquired momentum it almost achieved the domination of the Mediterranean. But that momentum was arrested, and who to-day would dream of basing one of the world's capitals upon the vacant little natural features which once bore Carthage? Set in contrast Marseilles and Constantinople. They occupy sites of perennial significance : Marseilles in the passage between Alps and Pyrenees from fertile France to the Mediterranean shore, and Constantinople at the crossing of the seaway from fertile Russia with the landway into populous Asia ; they have never lost their importance, have always renewed their momentum.

In my view Glasgow, Manchester, and London owe their greatness to-day mainly to momentum from the past. In course of time a hundred pounds will grow to a million by compound interest, and it is always fascinating to investigate the beginnings of a fortune ; in like manner the little streams, hills, woods and marshes, which before the houses were built shaped the site of the city, hold our imagination, but have little actually to do with the persistence of Clyde shipbuilding or of Lancashire cotton-spinning or of the London money market and entrepot trade.

How important is the element of momentum in the present geography of the world is seen when we realise that Europe occupies less than two per cent. of the Globe's surface, and Great Britain only a little more than two per cent. of Europe, and yet Great Britain consumes one-third of all the wheat borne across the ocean. This mighty British momentum will not easily be arrested ; it has the strength of the whirlpool and has survived the World War. But had we been defeated, the pitiful fate of Vienna would have fallen on Glasgow, Manchester, and London, and they could never have recovered, for the momentum on which they now exist would have been destroyed.

The citizens of Glasgow, be they employers or employed, are in truth all capitalists. They depend for very existence on a running organisation and world-wide goodwill which have come down to them from their predecessors. That is not to say that they should timidly abstain from healthy contention among themselves, for the going concern must be improved as it runs if it is not to be left behind by upstart competitors. But it does signify that their economic strife should always be tempered by the consciousness that they are the guardians of a society for their children which they can destroy but never recreate.

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